NEUROPSYCHIATRIC NUMBER

THE JOURNAL OF THE AMERICAN OSTEOPATHIC ASSOCIATION

Vol. 47, No. 4 | 139 N. Clark St., Chicago 2, Ill. | December, 1947

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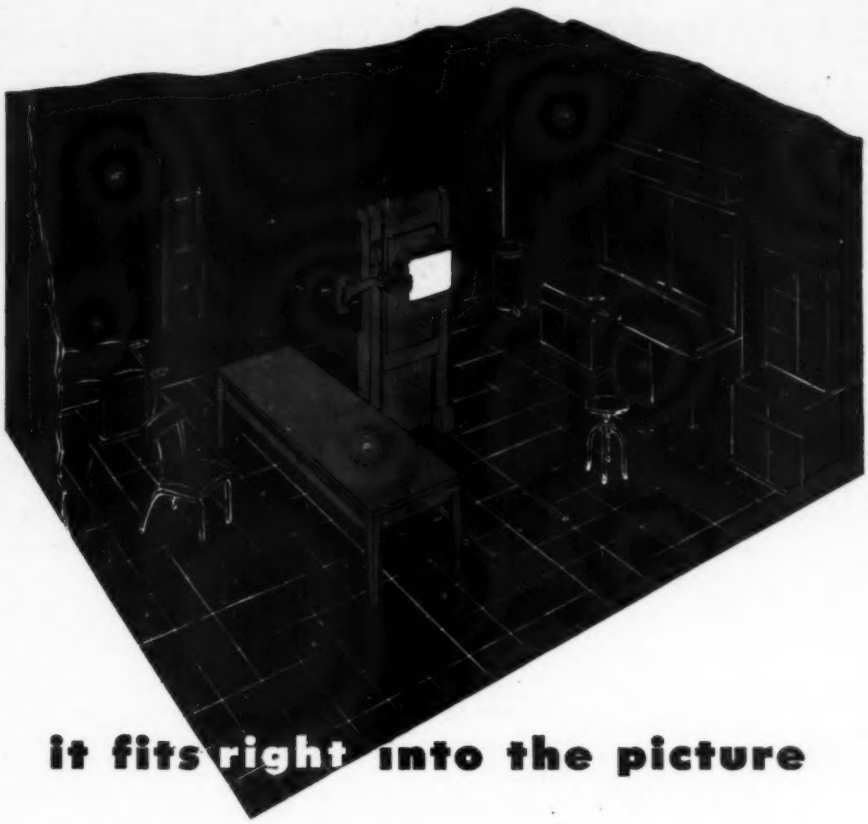

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Published monthly by the American Osteopathic Association. Office of Publication, 100 S. Kenilworth Ave., Oak Park, Ill. Address all communications to the Main Office at 139 North Clark St., Chicago 2, Ill. Subscriptions $10 a year. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917, authorized August 31, 1922. Entered at the Oak Park, Ill., post office as second class matter, April 1, 1926, under the Act of March 3, 1879.

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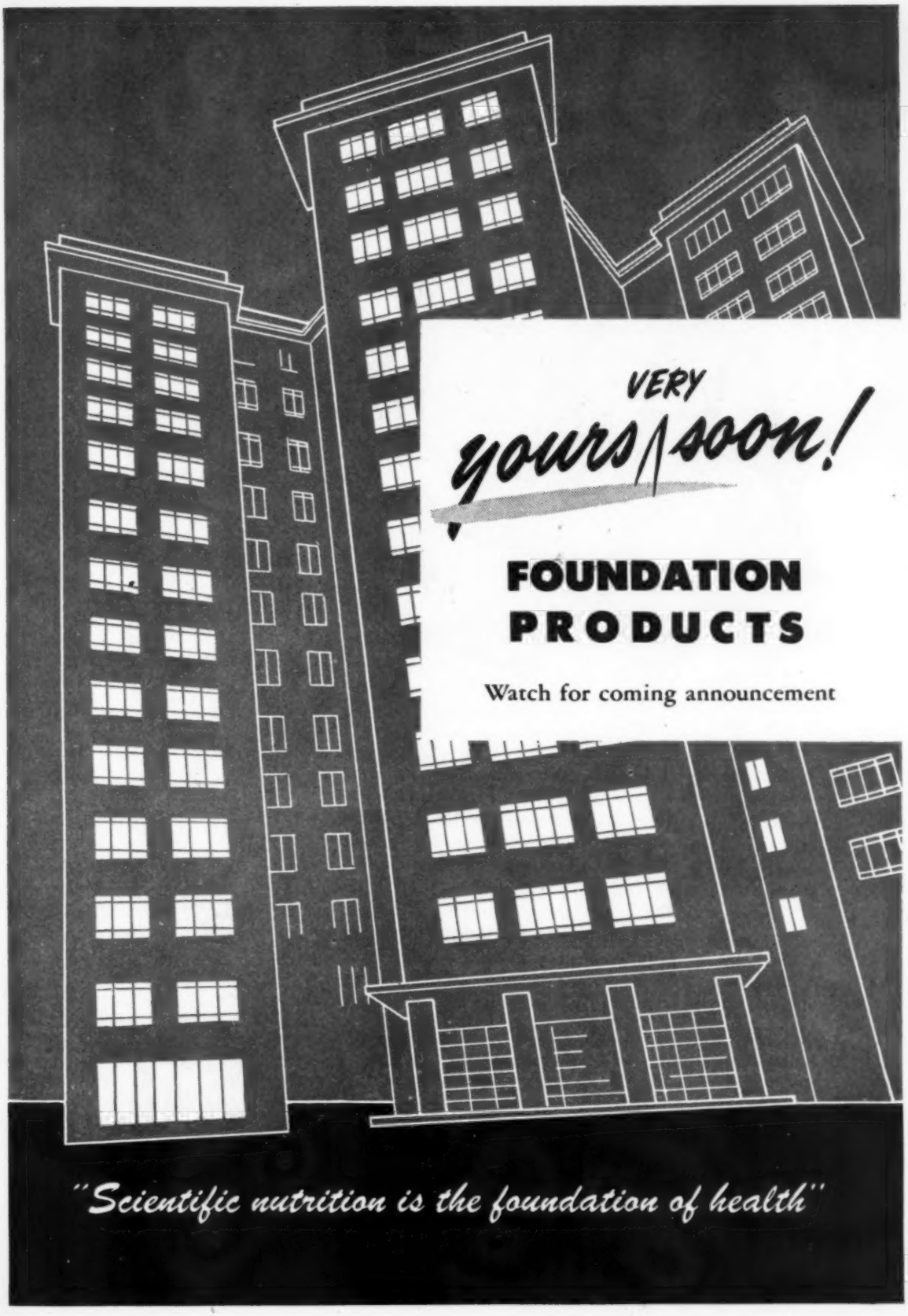
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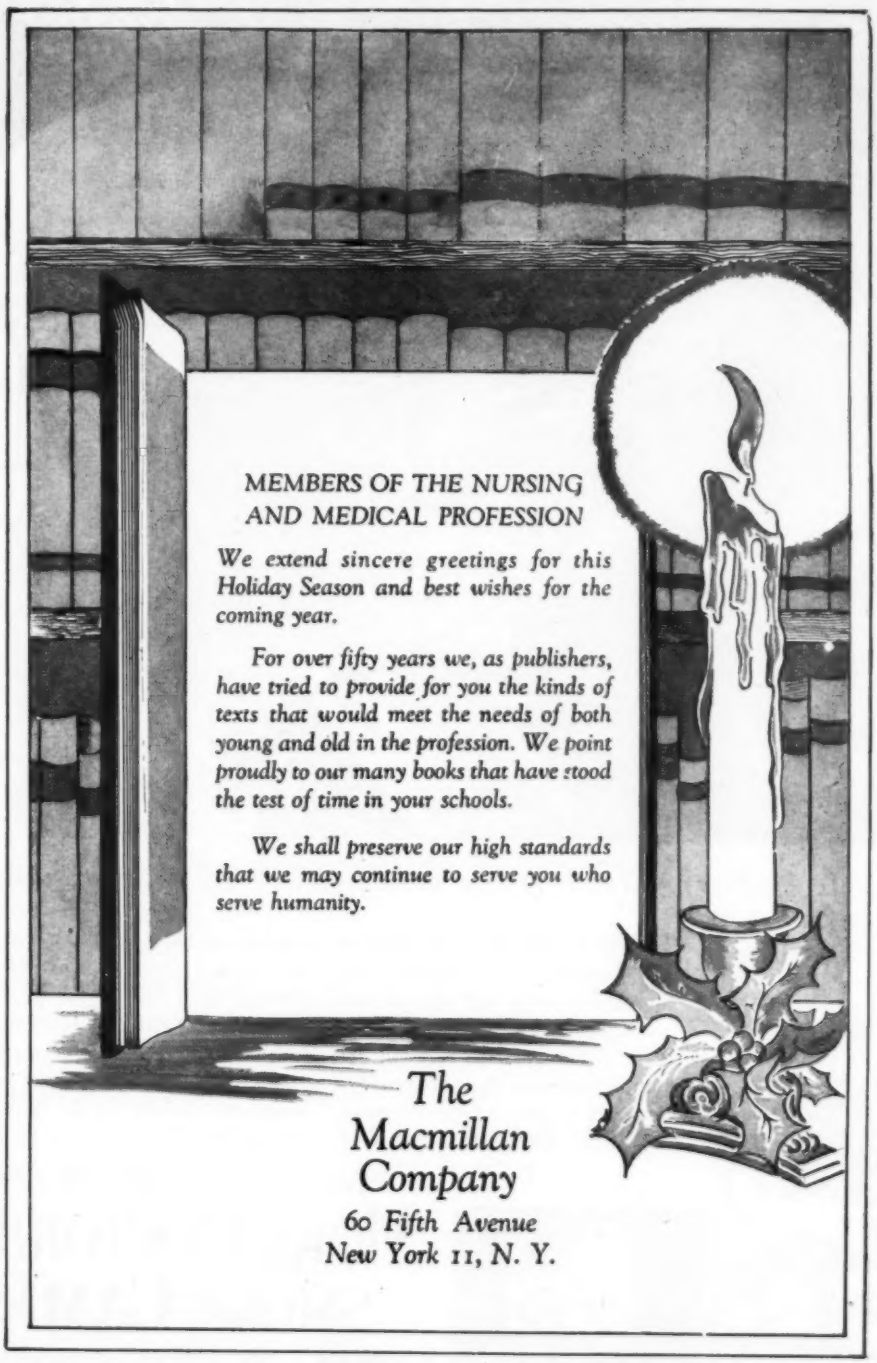
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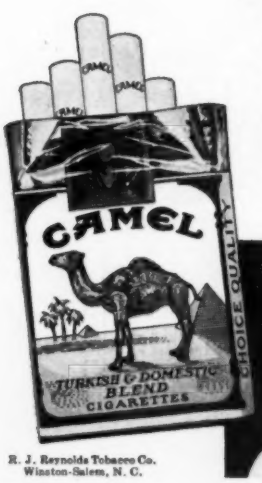

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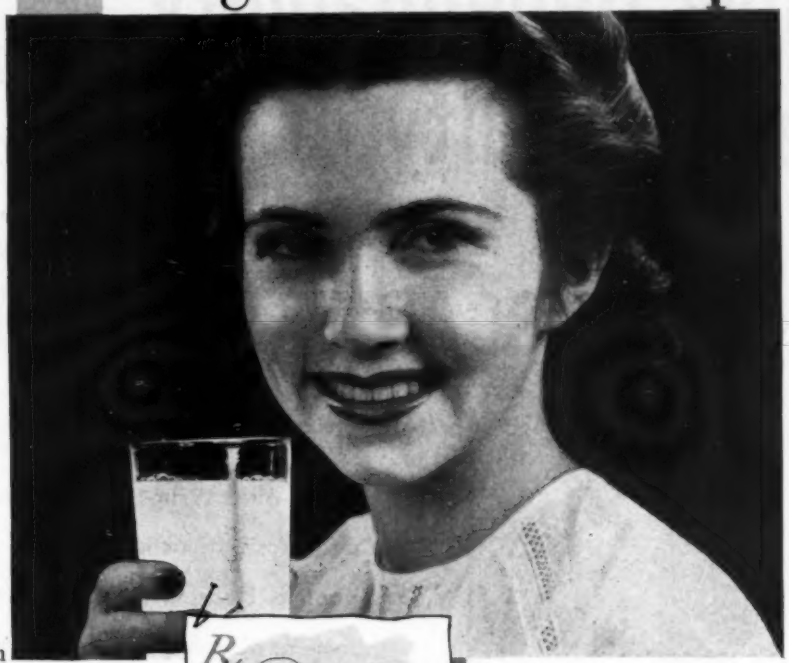

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1. Bridges, M. A.: Dietetics for the Clinician, Lea & Febiger, 4th ed., 1941. 2. McLester, J. S.: Nutrition and Diet in Health and Disease. W. B. Saunders Co., 4th ed., 1944. 3. MacLeod, G. and Taylor, C. M.: Rose's Foundation of Nutrition, The Macmillan Co., 4th ed., 1944. 4. Sherman, H. C.: Chemistry of Food and Nutrition, The Macmillan Co., 7th ed., 1946.

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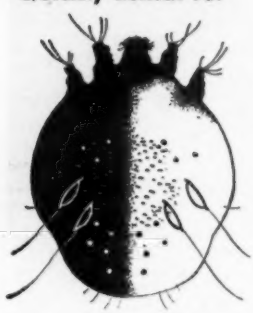

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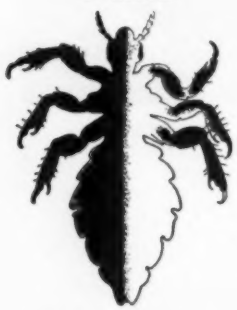

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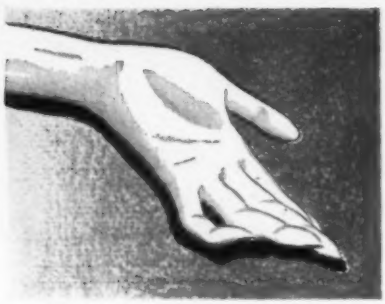

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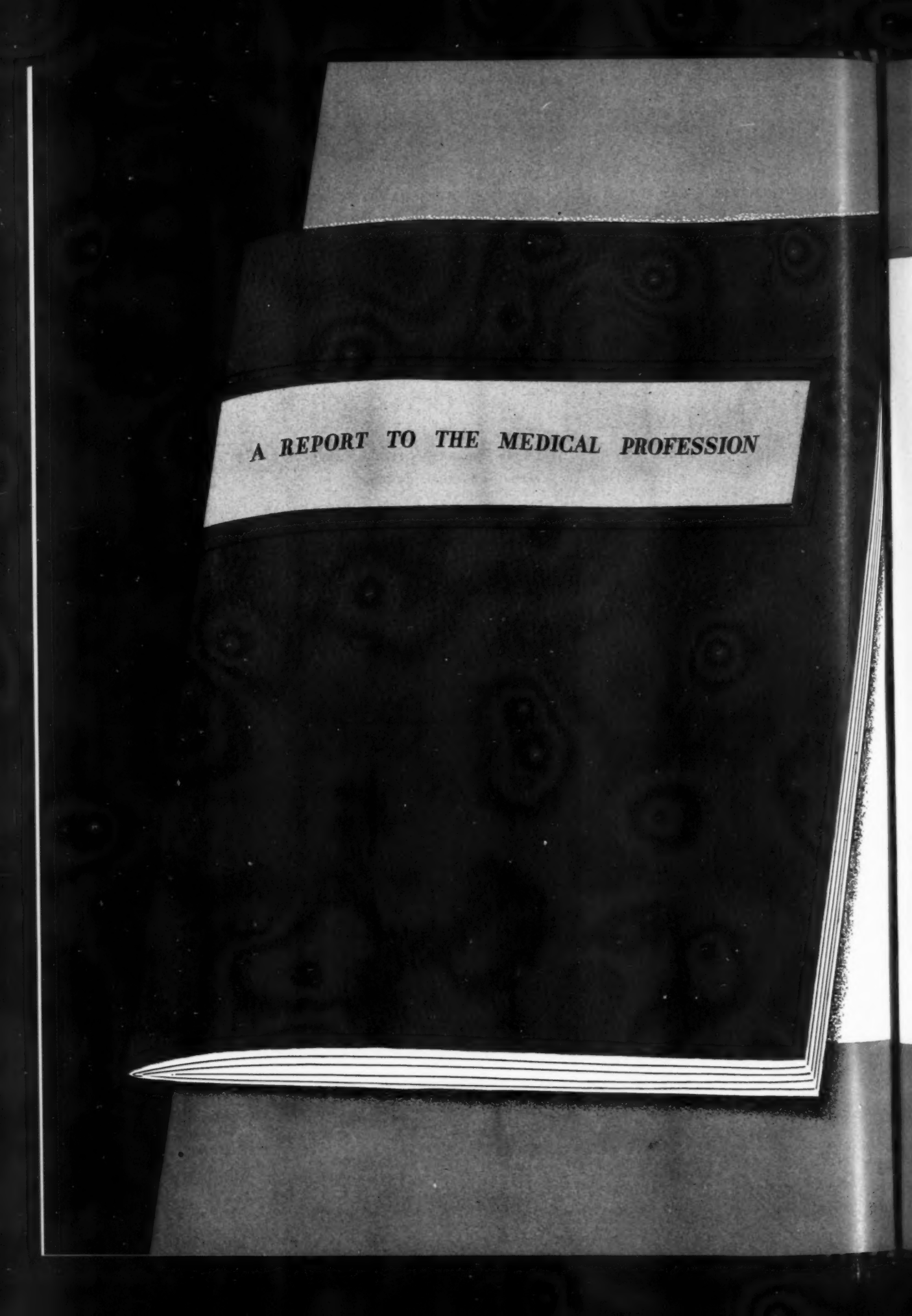
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Considering the importance of the subject and the authority of many of the investigators, this volume may prove of utmost value in your own practice.

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Johnson's

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DIRECTIONS: Soak the plaster in lukewarm water (1 to 2 minutes) and apply to chest (front, side or back). Remove plaster when skin is thoroughly reddened, usually within 5 to 10 minutes.

CAUTION: Do not keep plaster on long enough to blister the skin—never over 15 minutes. If blistering occurs because plaster is left on longer than 15 minutes, apply Johnson's Baby Cream or Petroleum Jelly to soothe the irritated area. When used on children or adults with sensitive skin, place a layer of wet gauze or cloth between plaster and skin.

A Johnson-Johnson PRODUCT

for chest colds

The time-proved mustard poultice in modern, ready-to-use form

• The old-fashioned mustard poultice has long been recognized as sound therapy. For example, Blumgarten's "Textbook of Materia Medica, Pharmacology and Therapeutics," 1937, notes that rubefacients or counter-irritants are useful "to relieve pain and tightness in the chest and congestion and inflammation in the lungs."

• Whenever this type of treatment is indicated, you will find that Johnson's MUSTARD PLASTERS offer many advantages to your patients. Each plaster comes ready to use. Nothing to prepare. No mess. No fuss. On and off in a few minutes. Heats the spot, stimulates circulation, helps relieve chest colds, bronchitis, sore throat.

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WITH DESOXYEPHEDRINE

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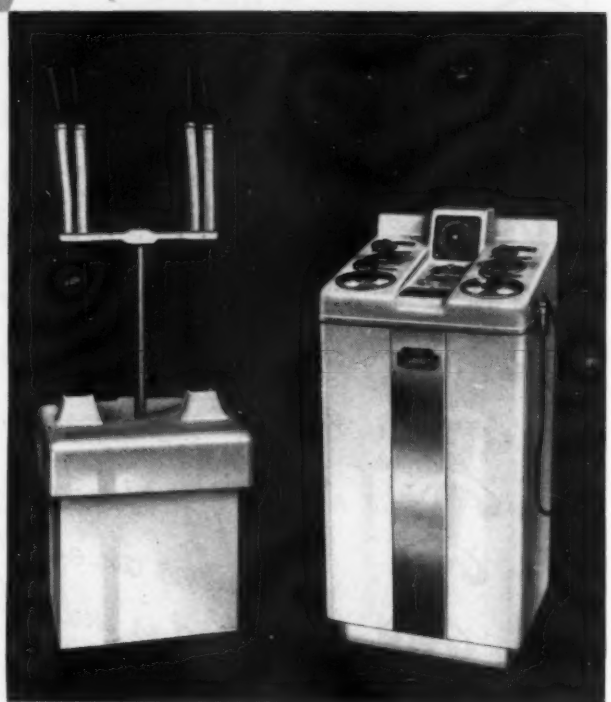

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From Cereals through Strained and Junior Foods, ready-to-serve Gerber's have a way of ***keeping everybody happy!***

For FREE SAMPLES of Gerber's 3 Cereals—plus professional reference cards, write to Gerber's, Dept. 3712-7, Fremont, Mich.

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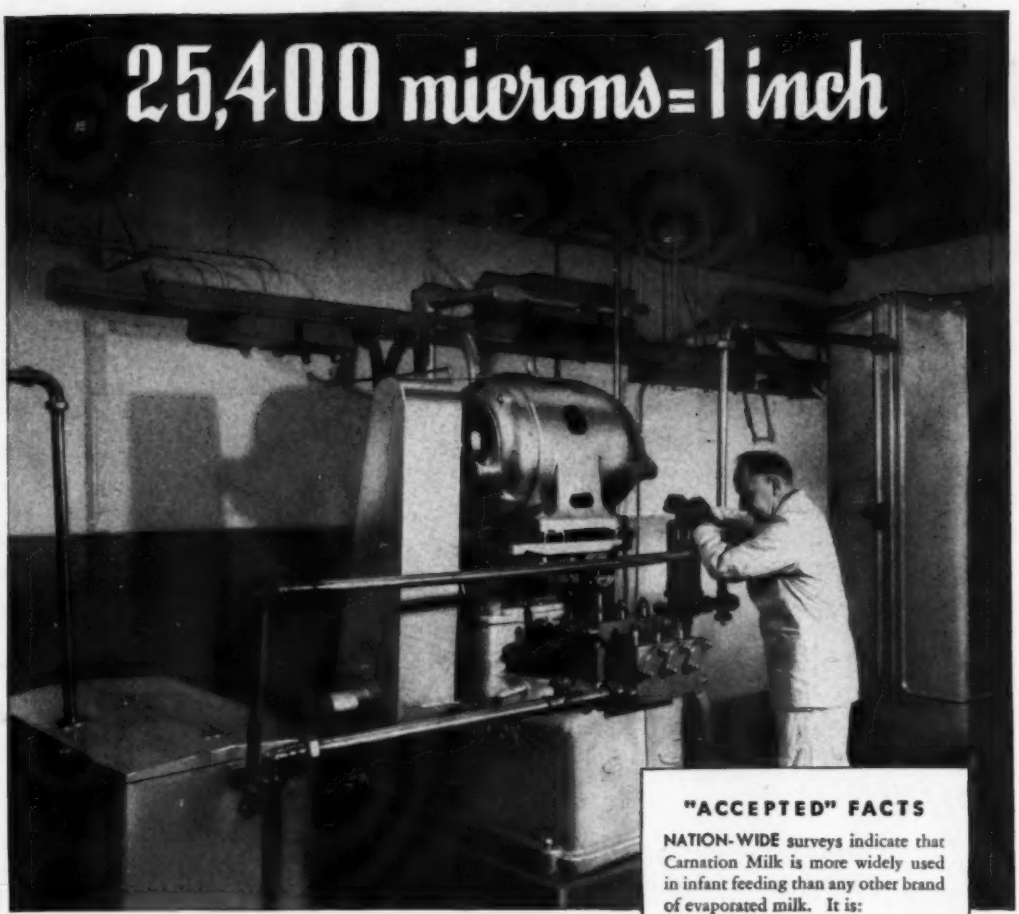
Fremont, Mich.—Oakland, Calif.

3 CEREALS • 18 STRAINED FOODS • 12 JUNIOR FOODS

25,400 microns = 1 inch



GENERATING a pressure mounting as high as 3000 pounds per square inch, this Carnation homogenizer forces the milk through almost invisible apertures. The original large butterfat globules are pulverized to a size of 1 to 3 microns, and evenly dispersed throughout the milk. This renders the butterfat more readily assimilable and brings uniformity to the formula in which this good milk is used. . . . Yet this is merely one of many scientifically controlled processes that contribute to the recognized value of Carnation Evaporated Milk for infant feeding and special dietary uses.

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HEAT-REFINED—forming fine, soft, flocculent, low-tension curds.

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"From Contented Cows"

THE LANTEEN DIAPHRAGM is rigid in one plane, therefore easy to place. When largest comfortable size is fitted, if entering rim lodges against cervix, trailing rim cannot be forced into pubic arch.

***Lanteen jelly* has three important advantages:**

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3. **Non-irritating . . . Non-toxic.**

Offered only through the medical profession. Complete package sent physicians on request.

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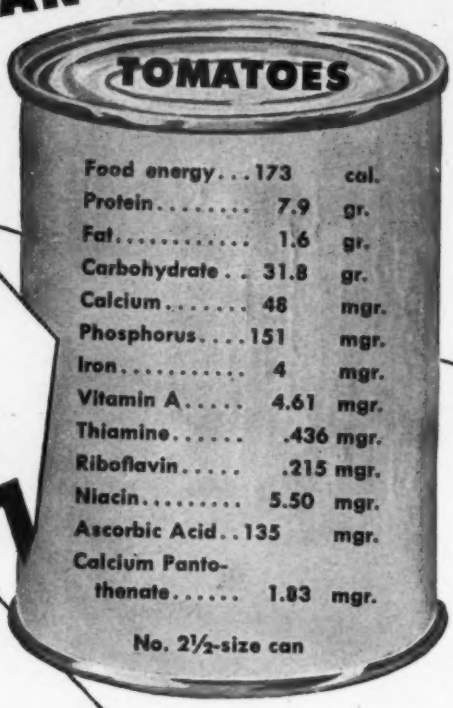
HERE ARE SPECIFICS ON

WHAT'S IN A CAN OF TOMATOES

A continuing research project*—now in its sixth year—throws the spotlight on the nutritional values of commercially canned foods. The figures for tomatoes, as well as those for the 40 other foods studied, represent *net-after-processing* averages.

*This project is sponsored by the National Canners Association and the Can Manufacturers Institute, the work being carried on at several leading American universities.



Contribution to Nutritional Knowledge Now in Handy Booklet Form

More than twenty papers, reporting results of above research, have appeared in various scientific journals. They cover principal nutrients in the 41 canned foods which represent almost 50% of our national canned food consumption.

Our new booklet, "Canned Foods in the Nutritional Spotlight," gathers this material together and presents it in concise reference form. It tabulates nutritive values of individual foods and in addition charts foods by rank as sources of six chief vitamins, three minerals, fat, protein, and carbohydrate. In referring to these figures, remember that they are *net-after-processing* figures.

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OBRON

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8 VITAMINS

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Specifically Designed for the OB Patient

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OBron conveniently helps to meet the increased nutritional demands engendered by the accelerated glandular activity and the loss of large amounts of nutrients in the milk.

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Two Forms: "IMPROVED VITAMIN" and "ANTACID AND ABSORBENT"

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For hands that inspire patients' confidence—

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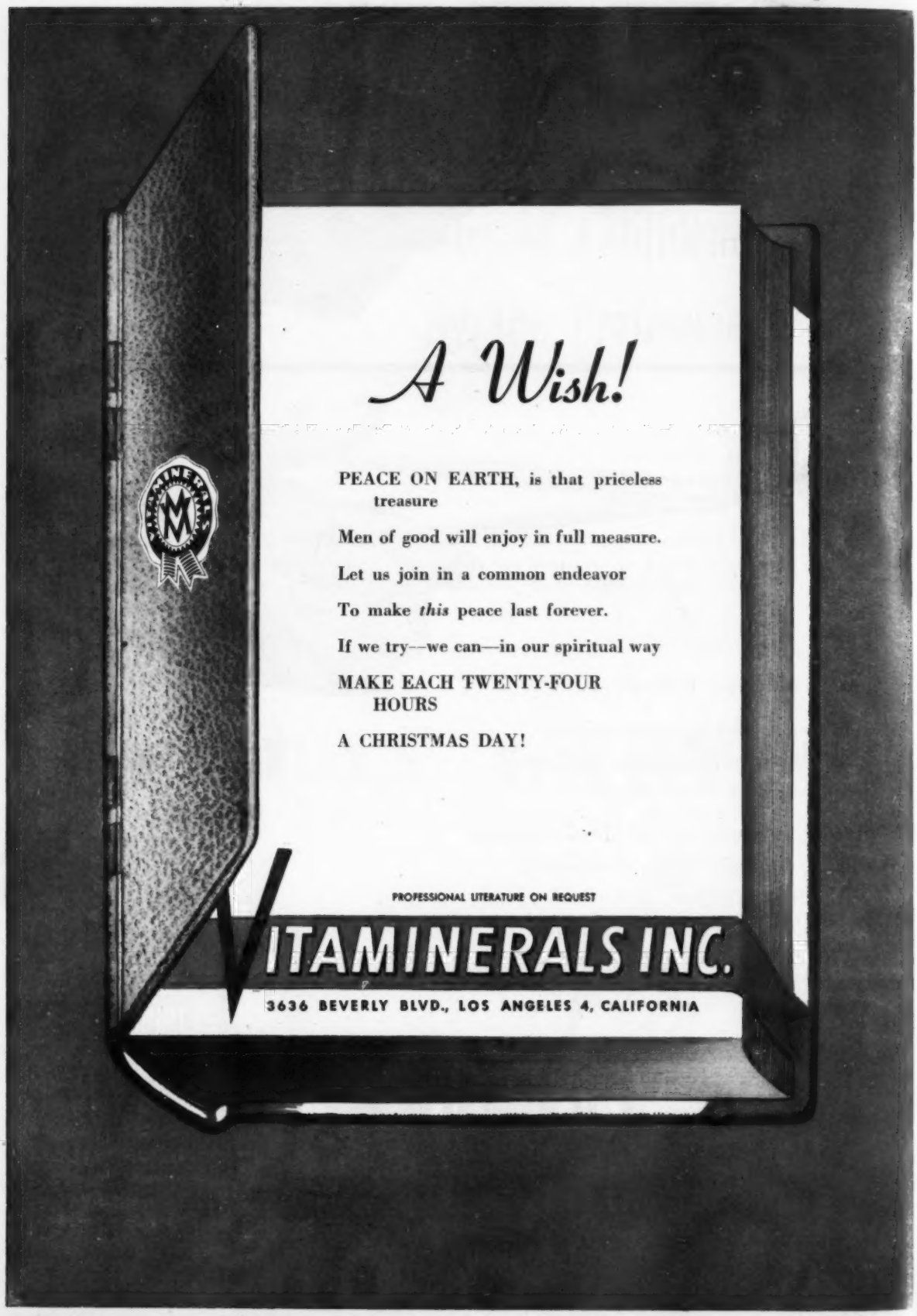
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PEACE ON EARTH, is that priceless treasure
Men of good will enjoy in full measure.
Let us join in a common endeavor
To make this peace last forever.
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THIS DELICIOUS FLAVOR

robs the bland diet of monotony

Malt-o-Meal goes far in adding "color" and attractiveness to the restricted diets frequently indicated in the management of the aged. Its delightful flavor is a bright spot in any diet, and is enjoyed by all patients.

A fortified farinaceous wheat cereal flavored with toasted malt, Malt-o-Meal is bland, mechanically as well as chemically. It fits well into the dietary plan required in esophageal stenosis, dysphagia, chronic gastritis and other gastric affections, dysentery, colitis. It cooks to creamy consistency in three minutes, and provides not only the basic nutrients found in wheat, but also significant amounts of thiamine, riboflavin, niacin, and iron. Its virtual freedom from irritant residue (fiber content 0.4%) makes it especially applicable when excessive peristaltic activity is to be avoided.

CAMPBELL CEREAL COMPANY, Minneapolis, Minn.

Malt-o-Meal

Malt-o-Meal, an enriched wheat cereal flavored with toasted malt, provides per ounce (dry weight), 0.29 mg. of thiamine, 0.13 mg. of riboflavin, 1.09 mg. of niacin, and 2.00 mg. of iron. Thus Malt-o-Meal provides appreciably more thiamine, riboflavin, and iron than does whole wheat, and 78% of the niacin content of whole wheat.

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3 OUTSTANDING ADVANTAGES in PSORIASIS

RIASOL has met with outstanding success in the treatment of psoriasis. Among the reasons for its success are three very important factors.

1. *Patient Acceptance.* Patients are prompt to accept a prescription such as RIASOL, because they usually learn that it is effective in clearing the ugly psoriatic patches.

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RIASOL contains 0.45% mercury chemically combined with soaps, 0.5% phenol and 0.75% cresol in a washable, non-staining, odorless vehicle.

Apply daily after a mild soap bath and thorough drying. A thin, invisible, economical film suffices. No bandages necessary. After a week, adjust to patient's progress.

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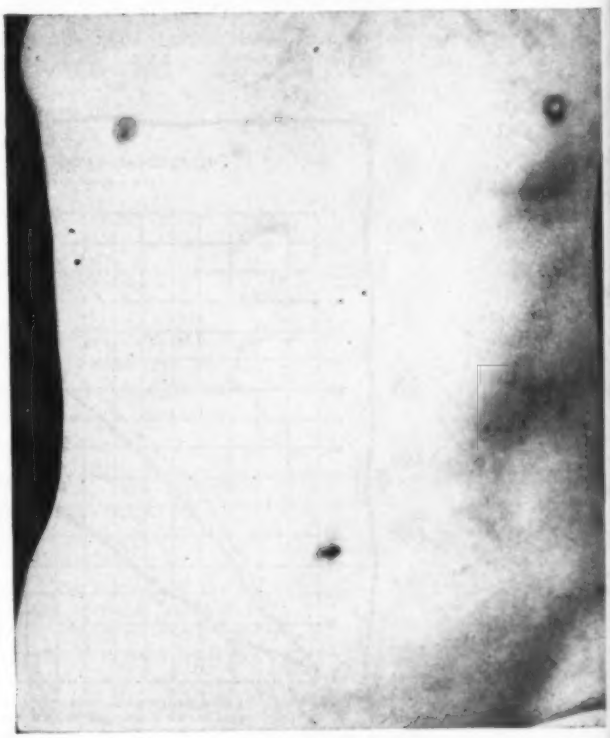

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RIASOL for PSORIASIS

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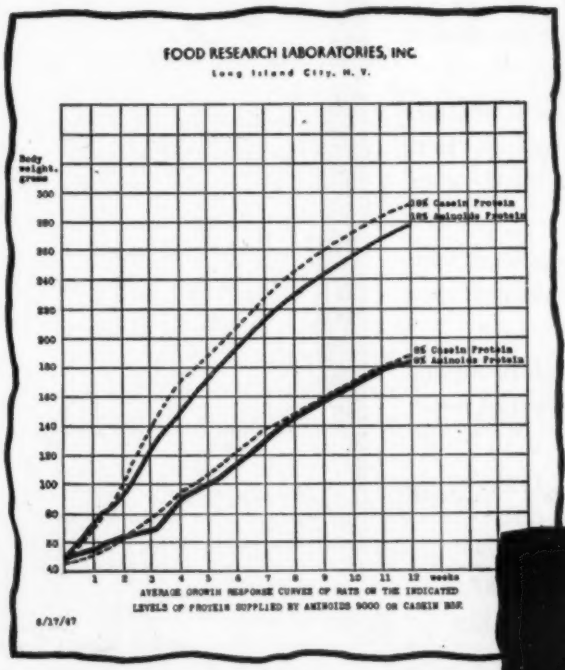
A PROTEIN HYDROLYSATE PRODUCT

Biological Value Enhanced
Palatability Retained

IMPROVED BIOLOGIC EFFICIENCY.

Rat-growth curves, determined by independently conducted tests, demonstrate the high biological value of **AMINOIDS,*** compared with casein, recognized as a high-quality protein.


FOOD RESEARCH LABORATORIES, INC.
Long Island City, N. Y.
Body weight, grams
10% Casein Protein
10% Aminoids Protein
5% Casein Protein
5% Aminoids Protein
1 2 3 4 5 6 7 8 9 10 11 12 weeks
AVERAGE GROWTH RESPONSE CURVES OF RATS ON THE INDICATED LEVELS OF PROTEIN SUPPLIED BY AMINOIDS 9000 OR CASEIN BSP.
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PALATABILITY and ADAPTABILITY.

AMINOIDS retains the inviting palatability long associated with its name. May be given in a variety of appetizing ways—in hot or cold liquids, desserts, cereals, etc.

AMINOIDS is derived from selected protein sources (liver, beef muscle, wheat, soya, yeast, casein, and lactalbumin). Analysis indicates the presence of all the essential amino acids in significant quantities.

Amino Acid Analysis†

Amino Acid	On Protein Basis N x 6.25 = 100% %
Arginine	3.0
Histidine	2.6
Lysine	5.8
Tyrosine	4.1
Tryptophan	1.3
Phenylalanin:	5.8
Cystine	1.2
Methionine	2.4
Threonine	3.6
Leucine	10.2
Isoleucine	7.7
Valine	6.8

One tablespoonful t.i.d. supplies 12 Gm. of protein as hydrolysate.

Supplied as a dry, granular powder, in bottles containing 6 oz.

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For Oral Administration

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For the optimum protection which can be furnished by a vaginal jelly—"RAMSES"* Vaginal Jelly can be specified with the confidence that no better product is available. Active ingredients: Dodecaethyleneglycol Monolaurate 5%; Boric Acid 1%; Alcohol 5%.

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THE *Ottawa* THEORY ON *Arthritis*

• WE BELIEVE:

Arthritis is a symptom only—not a disease entity unto itself.

Arthritis is a symptom of a malfunctioning body. These dysfunctions and imbalances must be overcome before permanent benefit can be secured in any case.

No one has JUST arthritis. In reality, anyone with arthritis or other rheumatic conditions has definite imbalances of the glands and organs and blood stream—frequently without being aware of irritations. These are the causative factors responsible for arthritis.

• THEREFORE, WE DO:

Find these imbalances, overcome them, and outline a program of treatment—for each individual case—to be followed by the patient under your direction.

Treat the whole body, not just the point of the manifestation.

Secure for each case the maximum permanent benefit—in the minimum length of time.

We will be pleased to be of service to you and your patients. Your inquiries invited.

With diagnosis to find the causative factors and treatment outlined to overcome those causes—case I (Top) need never become case II (Bottom).

OTTAWA ARTHRITIS SANATORIUM AND DIAGNOSTIC CLINIC

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"A Registered Osteopathic Institution"

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Rx

A combination of Bristol Alminate with phenobarbital and belladonna alkaloids, for gastric irritability.

The rapid professional acceptance of Alminate (aluminum dihydroxy aminoacetate) as a gastric antacid, has prompted us to offer physicians a companion product. Barbonate combines in one formula the tested antacid effect of Alminate with the antispasmodic and sedative action of phenobarbital and belladonna alkaloids.

BARBONATE, in bottles of 100 pleasantly flavored tablets, is available for your prescription at your pharmacist's. Send for a sample.

Aluminum dihydroxy aminoacetate (Alminate—Bristol)	0.5 Gm. (7½ gr.)
Phenobarbital, U.S.P.	8.0 Mg. (1/8 gr.)
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Oil of Peppermint	q.s.

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New (3d) Edition—Just Published

LEWIN—The Foot and Ankle

THEIR INJURIES, DISEASES, DEFORMITIES AND DISABILITIES

By PHILIP LEWIN, M.D., F.A.C.S.

Professor of Bone and Joint Surgery and Acting Head of Department, Northwestern University Medical School

The osteopathic physician will find this book most helpful in the treatment of common foot and ankle defects. It is well organized and the material is presented in an orderly manner, beginning with embryology and anatomy and progressing to clear, concise discussions of the physiology and biomechanics of the foot and ankle.

Dr. Lewin has made extensive revisions for this *new (3d) edition* and added a large amount of new material which has resulted in an increase of 182 pages. There are 102 new illustrations. In its present form, the book contains the latest recognized facts and reflects the modern concepts of etiologic factors, diagnosis and treatment. It is almost encyclopedic in scope.

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Mellin's Food—A Milk Modifier

The good results from the use of Mellin's Food over a period of eighty years, unique in the history of infant feeding, is worthy of the careful thought of any physician in the selection of a milk modifier for the preparation of nourishment for babies deprived of breast milk.

Evidence of the effectiveness of Mellin's Food as the modifier is not only apparent during the bottle-feeding period but is observed in later months as the infant becomes a child with an excellent foundation for further rapid growth toward adult life.

Modifications arranged for physicians' use furnish constituents in quantity and of a quality to satisfy the nutritive needs in relation to age and weight, with a supply of liquid to maintain water balance.

If the physician prefers to be the judge of the proportions of milk and water for the individual infant, it is suggested that not less than six level tablespoons of Mellin's Food be used in preparing the full day's feeding mixture. The nutritive value of this quantity of Mellin's Food follows:

Maltose	24 grams
Dextrins	8 grams
Proteins	4.2 grams
Minerals	1.7 grams

Bowel movements of infants fed on mixtures containing Mellin's Food as the modifier are usually regular with stools of good consistency. Constipation is rare; likewise colic or other digestive disturbances.

Mellin's Food Company, Boston, Mass.

MELLIN'S FOOD: Produced by an infusion of Wheat Flour, Wheat Bran and Malted Barley admixed with Potassium Bicarbonate—consisting essentially of Maltose, Dextrins, Proteins and Mineral Salts.

SAFE . . . EFFICIENT PORTABLE

GOMCO Explosion Proof SUCTION and ETHER UNIT

Weighing only fifty pounds, the Gomco "910" is a complete, compact unit with handy carrying handle and the long-lasting construction features of the well-known Gomco cabinet models. The dependable, easily controlled suction and ether systems include 16-oz. ether bottle and 32-oz. suction bottle, both firmly mounted.

For safety, the extra-large motor and switch are completely sealed in . . . all approved by the Underwriters Laboratories for use in ethyl-ether atmospheres.

For full details on this efficient unit that saves you space, ask your supply house, or write:

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17" "	7¼" "	11" "
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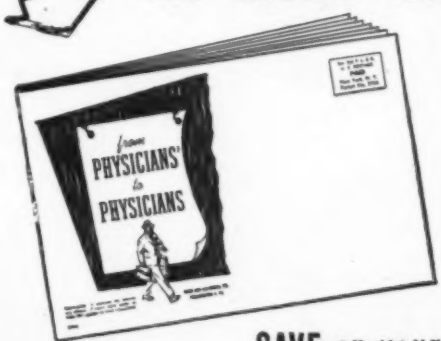

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The Journal of the American Osteopathic Association

PUBLISHED MONTHLY BY THE AMERICAN OSTEOPATHIC ASSOCIATION

Vol. 47, No. 4 | 139 N. Clark St., Chicago 2, Ill. | December, 1947

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The Neural Basis of the Osteopathic Lesion* †

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INTRODUCTION

Four of the main principles in osteopathy appear to be:

1. Joints and their supports are subject to anatomic and functional derangements.
2. These derangements have distant as well as local effects.
3. They are related, directly or indirectly, to other pathologic influences.
4. They may be recognized, and their local and distant effects influenced favorably by manipulation.

Accepting the existence of joint derangements (osteopathic lesions), it is our purpose in this paper to examine not the mechanical and etiological factors involved, but rather the fundamental basis for principles 2 and 3 and to a small extent principle 4, and to report progress in our understanding thereof.

The osteopathic lesion has many aspects which are partly revealed in the local and distant effects referred to as principle 2. Included among these are:

1. Hyperesthesia, especially of the muscles and vertebrae
2. Hyperirritability, reflected in altered muscular activity and in altered states of muscular contraction
3. Changes in tissue texture of muscle, connective tissue, and skin
4. Changes in local circulation and in the exchange between blood and tissues
5. Altered visceral and other autonomic functions.

How are these effects produced? What are the central factors responsible for these manifestations of structural and postural abnormalities? What in the intrinsic nature of the osteopathic lesion is the basis for the peripheral, palpable, and clinical effects? What fundamental changes take place as a result of effective manipulative therapy?

The detailed answers to these questions are, of course, not yet available, but reliably indicated are the general nature of the final answer and the direction in which we must proceed in order to obtain it. The research program of the Kirksville laboratories is designed to procure some of these answers through exploration of the intimate mechanisms involved in the osteopathic lesion. We believe that the answers are obtainable only through fundamental, experimental research and that the emerging concept of the lesion and its implications will have considerable impact on the practice of osteopathy.

In this paper will be presented some of our current views, some of the practical implications, and some speculations. The details of the experimental methods and the raw data, available in earlier publications,[1,2] will not be presented, but rather the general experimental approach and the immediate conclusions therefrom. From these, in turn, will be drawn some generalizations.

THE NEURAL BASIS OF THE OSTEOPATHIC LESION

Within the nervous system, in the phenomena of excitation and inhibition of nerve cells, and in synaptic and myoneural transmission, lie the answers to some of the most important theoretical and practical osteopathic problems. The existence of a neural basis for the lesion has been known, of course, for a long time. The segmental relation of the osteopathic lesion to its somatic and visceral effects is explainable in no other way.

The activity and condition of the tissues and organs are directly influenced, through excitation and inhibition, by the efferent nerves which emerge from the central nervous system and which conduct impulses to these tissues and organs (Fig. 1). For example:

Muscle

A. Anterior horn cells (Motoneurons)—muscular contraction
B. Lateral horn cells (Sympathetic preganglionic neurons through postganglionic neurons)—vasomotor activity

Skin

C. Lateral horn cells—vasomotor activity
D. Lateral horn cells—sweat gland secretion
E. Lateral horn cells—piloerection

Viscera

F. Lateral horn cells—smooth muscle contraction
G. Lateral horn cells—glandular secretion
H. Lateral horn cells—vasomotor activity

The activity of these organs and cells is directly determined by the activity of their motor nerves. This nerve activity is measured in terms of: (a) The number of impulses conducted by each efferent nerve fiber,

*Presented before the Teaching Group on Osteopathic Principles, Diagnosis and Therapeutics at the Fifty-First Annual Convention of the American Osteopathic Association, Chicago, July 21, 1947.

†The research on which this paper is based was made possible by grants from the Research Committee of the American Osteopathic Association.

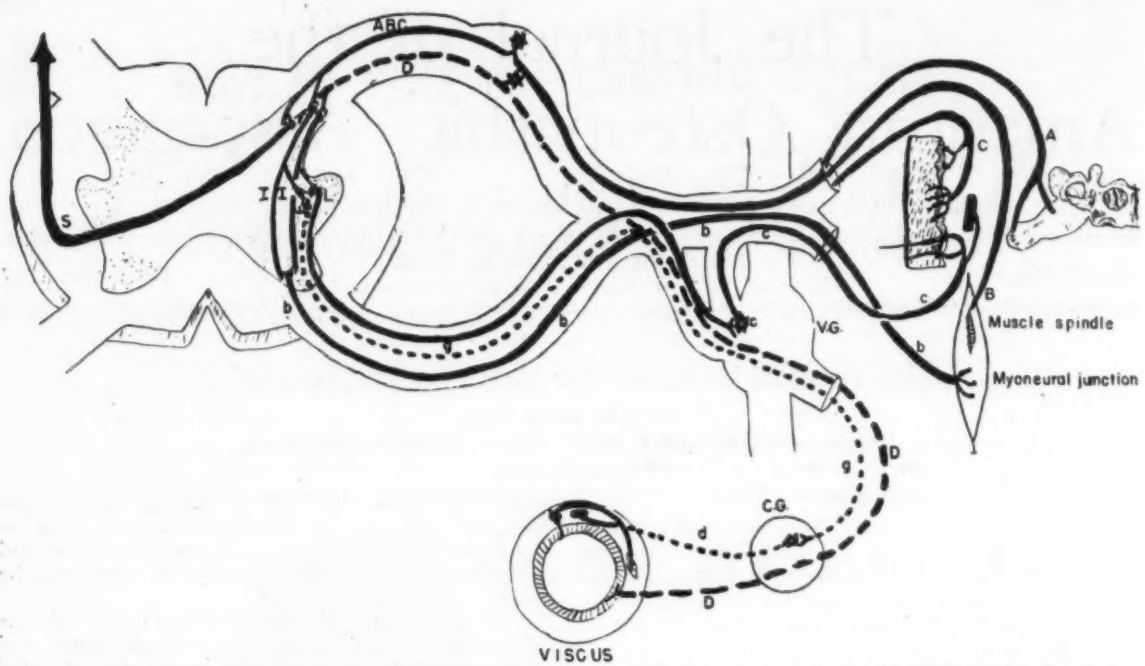

Fig. 1.—Diagrammatic representation of segmental reflex pathways among somatic and visceral afferents and efferents.

Afferents (Dorsal root neurons):

A—From spinous process, joints

B—From stretch and tension receptors (proprioceptors) in muscles and tendons

C—From touch, pressure and pain endings in skin

D—From viscera

ABC—Somatic afferents

Efferents:

b—motoneurons to skeletal muscle

c—sympathetic postganglionic neurons to blood vessels of skin and muscle; to sweat glands and pilomotor muscles of skin

d—sympathetic postganglionic neurons to visceral smooth muscle, blood vessels and glands.

S—Spinothalamic fibers

I—Interneurons

L—Lateral horn cells (sympathetic preganglionic neurons)

V.G.—Vertebral ganglion

C.G.—Collateral ganglion

and (b) the number of fibers involved. Thus, in the absence of impulses in the corresponding motor nerve, a muscle is completely at rest. The amount of contraction (tension produced or degree of shortening) at any moment is in proportion to the number of motoneurons which are conducting impulses at that moment and the average number of impulses per second which each is conducting to the muscle. With certain modifications this principle also applies to organs other than muscle. Abnormalities in these organs are produced by overactivity or underactivity of the efferent nerves.

SECONDARY EFFECTS OF NEURAL IMBALANCE

It is important to emphasize, however, that not all the effects of overactivity or underactivity of the efferent neurons are direct and immediate. Secondary effects often assume predominate importance. Thus, a muscle's overactivity, over a long period of time, may result in fibrosis and major chemical and metabolic changes; underactivity, in atrophy. Overactivity of sympathetic fibers which control arterioles may result in local anoxemia, inflammation, altered capillary permeability, edema, etc. Imbalance in the efferent neurons controlling the smooth musculature of the gastrointestinal tract may result in flaccidity or spasm with serious effects on digestion and absorption and, therefore, on the entire body economy. Overactivity or underactivity of the neurons controlling glands may result in disastrous shifts in acid-base, fluid, and electrolyte balance and in such conditions as peptic ulcers. If the gland happens to be one of the endocrines, the effects may be especially serious and extensive. We may for the present purpose include the spinothalamic fibers among the "efferent" neurons. These convey pain sensations to the brain and, when overactive, produce not only physical but also important psychological changes with potentially serious and extensive changes in motor and visceral activity. With the crucial importance of the efferent neurons in mind, more precise formulation of the problem is possible. There are three main questions:

1. What factors control the activity, i.e., the number of impulses, in the efferent nerve fibers?

2. How does structural abnormality, i.e., the osteopathic lesion, play upon these factors to produce overactivity or underactivity of these fibers and, therefore, of the organs which they innervate?

3. How does manipulative therapy play upon these factors to restore balance and cause regression of signs and symptoms?

FACTORS CONTROLLING EFFERENT ACTIVITY

Let us proceed to the first question. What factors has physiological research demonstrated to be primary in the control of activity of the efferent neurons? Two main principles have special pertinence here.

A. The principle of reciprocity states that through the network of interneurons (also known as internuncial neurons, intercalated neurons, and connector neurons), which is situated within the central nervous system, every neuron potentially influences, and is influenced by, almost every other neuron in the body.[3]

B. The principle of convergence states that many nerve fibers converge upon, and synapse with, each motoneuron. These presynaptic fibers convey impulses from a large variety of sources to the efferent neuron which, therefore, represents a final common path.[4]

Let us examine how these principles operate with respect to the anterior horn cells, keeping in mind that they probably operate in a similar fashion upon the other efferent neurons (Fig. 1).

1. Each anterior horn cell receives impulses from a large number of sources through the presynaptic fibers which converge upon and synapse with it. All the descending tracts in the spinal cord, conveying impulses from such sources as the cerebral cortex, red nucleus, medulla oblongata, the vestibular nuclei, cerebellum, the pons, superior colliculi, and other higher centers, establish synaptic connections with the anterior horn cell for the mediation of voluntary motion, equilibrium, postural reflexes, visuospinal reflexes, and others. The proprioceptors, stretch and tension receptors situated in the tendons and in the muscles themselves, are a steady and continuous source of impulses. They exert their influence directly through the dorsal root fibers into which they discharge their impulses or, indirectly, through the higher postural and equilibrium centers. Afferent fibers from the viscera may also play an important role. In fact, every afferent nerve fiber, whether it mediates touch, pain, pressure, temperature, sight, or any other sense modality, exerts influence upon the final common path represented by the motor nerves.

2. Some of the converging fibers exert an excitatory influence, others an inhibitory influence on the same motoneurons.

3. The activity of the motoneuron at any moment, that is, the frequency with which it delivers impulses to the muscle fibers, represents a dynamic balance among all the excitatory and inhibitory influences being exerted by the many neurons which converge upon it. The proprioceptors and some of the higher centers, through their steady, tonic control, act as governors or buffers. The balance, however, is shifted from moment to moment in accordance with changes in the internal and external environment and in response to volition. As previously stated, pathology results when the balance is shifted too far in one direction or the other (excitation or inhibition) for too long.

4. The collective action of the presynaptic nerve fibers upon the final common path is further reflected in the phenomena known to physiologists as reinforcement and facilitation. Before the anterior horn cell can discharge impulses into the muscle fibers, it must itself receive excitatory impulses simultaneously from a number of presynaptic fibers.[5] Stated another way: Before a given stimulus (e.g., to the skin) can produce a reflex muscular response, the anterior horn cell must first be "warmed up" or "put on edge" (facilitated) by impulses from other (excitatory) fibers which synapse with it. The efferent neuron must already be in a state of subthreshold or subliminal excitation. In other words, the various fibers converging upon a given group of motoneurons must cooperate (reinforce each other) in order to open the final common path leading to the muscle. In a whole nerve it has been demonstrated that a considerable portion of the nerve fibers must be in a state of subliminal excitation before *any* of them fire and cause muscular contraction.[6]

5. This requirement serves as a margin of safety or an insulation, preventing muscles from responding to every impulse which reaches the anterior horn cell.

6. When a significant percentage of the anterior horn cells in a given segment of the spinal cord is maintained in a state of subliminal excitation, they require little additional stimulus to produce a reflex response. This is reflected in our frequent use of the terms "on edge," "jumpy," "tense," which imply motor aspects of psychic imbalance. In individuals thus characterized the anterior horn cells are maintained close to, or at, threshold, even during rest.

THE OSTEOPATHIC LESION AND THE FACTORS CONTROLLING EFFERENT ACTIVITY

The second question in our series of three was "What is the relation of the osteopathic lesion to the above factors?" How do anatomic and functional derangements of the joints and their supports operate on these factors to produce seriously altered activity of the efferent neurons? Considerable light is being thrown upon this problem by the research in progress at Kirksville College of Osteopathy and Surgery under the directorship of Dr. J. S. Denslow. The research has revealed close relations between lesion mechanisms and certain well-established physiological principles. The general experimental approaches and the major conclusions from each are presented in the following section.

EXPERIMENTAL

Reflex Threshold.—Denslow,[3] proceeding from the observation made by all osteopathic physicians that pressure to the spinous processes of lesioned segments produces much more contraction in the spinal extensor muscles, and with less pressure, than is true at nonlesioned segments, set out to determine in a precise, objective manner how much pressure is required at each spinous process to elicit reflex contraction of the spinal extensor at the same level. In other words, his object was to determine whether, and to what degree, lesioned segments were distinguished from the normal by differences in reflex threshold.

Muscular activity was determined electromyographically, that is, by recording the electrical signs of muscular activity. Measured pressure stimuli were applied to the spinous processes by means of a calibrated pressure meter which simulated the action of the osteopathic thumb. At each segment gradually increasing pressure stimuli were applied to the spinous process until just detectable activity in the erector spinae mass was obtained; this represented the reflex threshold for that segment. The reflex arc under investigation might be said to consist of these parts: spinous process, dorsal root fiber, interneuron, anterior horn cell, and muscle fibers. (See Fig. 2, disregarding segmental designations and intersegmental connections.)

This pioneer study upon a large number of human subjects resulted in the demonstration that the reflex thresholds in lesioned segments were much lower than in normal segments. The more severe the lesion, as determined by palpation, the lower the threshold. The thresholds may be constant over periods of months.

What is the basis for the lowered reflex threshold of the lesioned segment? There were two obvious alternatives. (1) *The sore spines.* It was reasonable to suppose that the pressure receptors and nerve endings in the tender spinous process were hypersensitive and that, per gram of pressure, they fired more impulses at the anterior horn cells than did the corresponding endings in the normal spinous process. (2) *Hyperirritable motoneurons.* It appeared equally

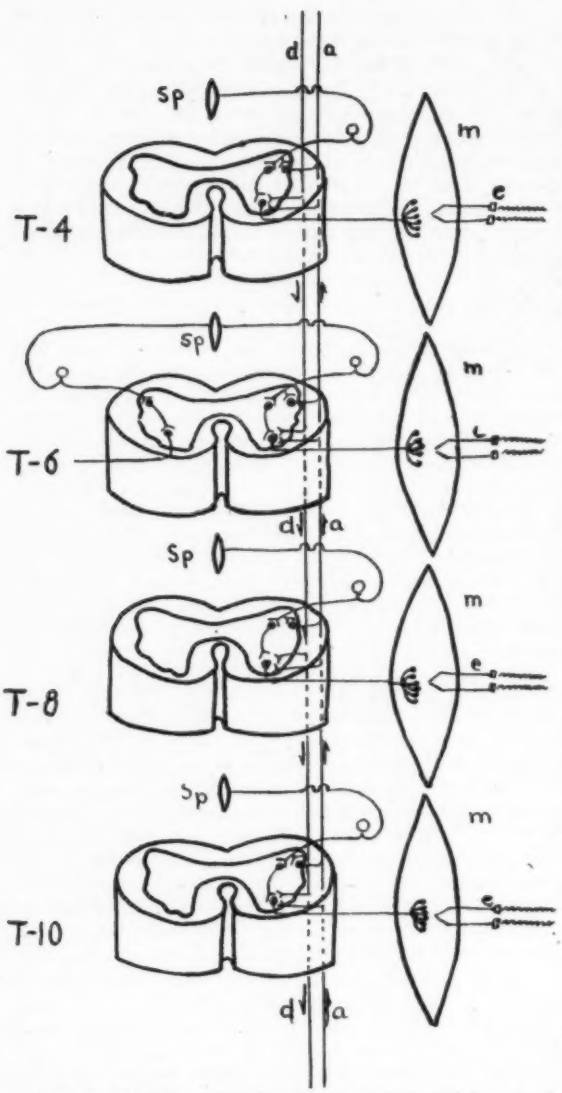

Fig. 2.—Diagram of reflex pathways involved in experimental measurement of segmental reflex thresholds and of intersegmental spread of excitation. (See text.)

sp—sensory endings in spinous process
a,d—ascending and descending intersegmental neurons
m—erector spinae mass
e—recording electrodes

reasonable to suppose that for some reason or other the anterior horn cells of the spinal extensor muscle in the lesioned segments were maintained at a higher level of excitability. In order to decide which was the more likely alternative, the following experimental approaches were undertaken.[2]

Intersegmental Spread of Excitation.—A lead to the answer was given in experiments in which spread of excitation from segment to segment was examined in relation to their respective thresholds, to the distance between them, and to other factors. The experiments were conducted as follows (Fig. 2). The four thoracic segments, designated as T4, T6, T8, and T10, were selected for this series of experiments on 30 subjects. Needle electrodes were inserted into the spinae erector mass 5 cm. to the left of the spinous process in each of the four segments, for the detection and recording of muscular activity. Pressure stimuli were applied to the spinous processes with the pressure meter.

The minimum pressure stimuli (threshold) required at each of the four spinous processes to elicit activity from each of the four muscle segments was then determined in turn. Thus, the pressure required upon the spine at T4 to elicit activity in the muscle at T4, in the muscle at T6, in the muscle at T8 and in the muscle at T10 was determined. This was then repeated at the other spinous processes, giving four thresholds at each spinous process, sixteen in all, in each experiment. The results will be summarized by illustrating with one hypothetical subject, eliminating some qualifications for the sake of brevity.

It was found that there was much more spread *to* lesioned segments than *from* lesioned segments. Thus, if T6 were a severely lesioned segment (very low threshold) while T8 and T10 (neglecting T4 for the moment) were normal or high threshold segments, the following obtained. It required very little pressure to the spinous process of T6 to elicit activity of the muscle in the same segment; but even very strong pressure stimuli to the same spinous process failed to produce any signs of activity in the muscles at T8 or T10. Conversely, although even very high pressures to the spinous processes of the latter two segments produced no activity in either of these segments, relatively slight pressures upon the spinous processes of each of them did stimulate reflex contraction at T6. Thus, excitatory impulses entering the cord at T10 "bypassed" the motoneurons of the same segment and those of a neighboring high-threshold segment, to emerge or produce effect at a more remote lesioned segment.

If T4 were moderately lesioned (as was often the case if there was a lesion at T6), it participated in exchange of excitation with T6, but usually only *received* excitation from T8 and T10.

Our conclusion from this series of experiments can be simply stated in an analogy. The anterior horn cell of the lesioned segment represents a bell easily rung from a number of push buttons, while the spinous process or push button of the lesioned segment does not easily ring bells other than its own. The hyperexcitability of the lesioned segment (that is, the relatively low reflex threshold) is demonstrable without applying pressure to the corresponding spinous process.

Procaine Studies.—It was of interest in this connection to determine whether and how the excitability of the lesioned segment was affected by desensitization of the spinous process with procaine. Infiltration of the periosteum around the spinous process raised the local threshold to that of a normal segment, that is, it was no longer possible to produce reflex response of the muscle of that segment with slight, moderate, or even heavy pressure stimuli to the spinous process of that segment.

In contrast, however, spread of excitation *to* that segment from other segments remained unimpaired; although pressure to the procainized spinous process of T6 no longer elicited reflex contraction at T6, it was still possible to elicit contraction at T6 by pressure upon spines T8 and T10. Thus, the hyperexcitability of the lesioned segment was again demonstrated independently of the spinous process; it exists even when the spinous process is desensitized.

Bilateral Differences.—On a few subjects the reflex responses on both sides of the same segment were

simultaneously observed (Fig. 2, T6). It was found that the spinal extensors on one side of the segment may respond reflexly to very slight pressure upon the spinous process while the other side requires much higher pressure to the same spinous process. In other words, low or high thresholds are not determined by the spinous process. The neurons in the left and right horns of the same segment may be maintained in different degrees of excitability. The left and right "bells" are rung with different degrees of facility from the same "push button."

Rest Activity.—The differential excitability of anterior horns in lesioned and nonlesioned segments was further and clearly shown in experiments in which the anterior horn cells were exposed, not to impulses from spinous processes but to generalized stimuli coming from within and without the body.

When a patient is prone and completely relaxed there is usually no activity in the spinal muscles; there is not even tone, as indicated by the absence of action potentials in those muscles. This is true, usually, even of segments in lesion.

Occasionally, however, it was found that muscular activity persisted in the absence of external stimulation. The subjects had to be carefully positioned and repositioned to eliminate as far as possible the afferent bombardment from the proprioceptors. It was found that when rest activity did occur, it was almost invariably in the lesioned, low threshold segments. Thus, the segment in lesion is the most sensitive to positional stress, conveyed by the proprioceptors in the muscles and tendons.

Mental factors may also be responsible for rest activity. Subjects who are apprehensive, anxious, or emotionally upset often show persistent rest activity. Such activity was always most marked in the lesioned segment; often it occurred *only* in the lesioned segments. The lesioned segment is thus hyper-responsive to impulses descending from the cerebrum.

Tactile stimuli also demonstrated the hyperexcitability of the anterior horn cells in the segment of lesion. If the back was slightly scratched or tickled with a pin, as over the shoulder or scapular area, continuing activity in the spinal extensors at the lesioned segment was often precipitated, but very rarely in the nonlesioned segment of the same subject. Thus impulses from touch and light pressure receptors in skin also find the most responsive anterior horn cells in the segments of lesion.

Occasionally we found a motor unit which fired in synchrony with inspiration or expiration; such a unit was invariably situated in the lesioned segments. Apparently such segments are hyper-responsive also to impulses from bulbar and pontine centers.

Interpretation of Experiments.—The following general conclusions may be drawn from these experiments as regards to motor activity in lesioned segments.

1. An osteopathic lesion is associated with a segment of the spinal cord which has a low motor reflex threshold, i.e., it represents a hyperexcitable segment of the cord. At least in the lesioned segments studied by us it may be said that the balance has been shifted too far for too long toward the excitatory side.
2. The lowered reflex thresholds are demonstrable independently of the related spinous process. Even though changes in the palpable characteristics and in pain sensitivity of the spines are important diagnostic features, they are apparently secondary to other, more fundamental alterations in the cord. This aspect will be discussed later.
3. The lesion represents an anterior root at least some of whose motoneurons are maintained in a state in which they are relatively hyperexcitable to all impulses which reach them. In a severe lesion many of the motoneurons are so close to threshold, even when the subject is at rest and reclining comfortably, that it requires very few additional impulses from the neurons which synapse with them to trigger those motoneurons into overt activity. Those additional impulses may come apparently from almost any source; the spinous process is but one such source.
4. The lesion, therefore, is to be conceived, not as a radiating center of irritation, spreading excitation to other segments, but rather as a segment upon which irritation is focused. It represents a place in the cord where barriers to motoneuron excitation have been lowered and which, therefore, channelizes impulses into muscles receiving motor innervation from that segment.

Basis For Segmental Hyperexcitability.—What is the basis for this segmental hyperexcitability? What keeps the motoneurons of the lesioned segment "on edge," that is, at a high level of subliminal excitation? These anterior horn cells can be maintained in this facilitated state by continuous and excessive bombardment from some untiring source or sources.

The Source of Impulses.—What are the untiring sources of impulses with which the anterior horn cells in the lesioned segments are continuously and excessively bombarded? First, their excessive activity is apparently associated with postural, mechanical, and articular derangements. Second, it must be recognized that they are apparently a highly stabilized and chronic source. Reflex thresholds in segments of lesion have been found to be very constant over periods of months and even years. Third, it must be recognized that they are probably highly localized, often restricting their facilitating effect to only one or two segments.

The sources which, in our opinion, most closely fulfill these qualifications are the proprioceptors, i.e., the stretch, tension, and pressure receptors in the muscles and connective tissues.

First, postural, mechanical, and articular derangements unquestionably cause increased fiber-length or tension in the muscles and tendons on at least one side of the articulation in question. The proprioceptors are highly sensitive to changes in fiber-length or tension.

Second, they are the nonadapting type of receptor. They keep firing impulses into the cord via the dorsal root fibers as long as they are under tension and at frequencies which are proportional to the tension. The higher the tension, the higher the afferent bombardment for as long as the tension is maintained.

Third, the afferents from proprioceptors not only have segmental distribution, but they specifically influence the activity of the muscles to which they are most closely related or in which they are situated. This specificity extends not only to the muscles themselves, but to specific muscle heads. It is thought that the

muscle spindle cells reflexly influence only the muscle fibers in their immediate vicinity. In this way, highly localized, vicious cycles of irritation may be set up.

We, therefore, believe that these receptors play a prominent role in maintaining segmental hyperexcitability in areas of lesion. As a result of the continuous barrage of impulses which they fire into the cord at their level, the anterior horn cells of the corresponding segment are maintained in a state of chronic facilitation—at a high level of subliminal excitation, even during rest.

Effects of Chronic Facilitation.—In these segments, therefore, it may be said that the normal "insulation" which keeps the efferent neurons from firing in response to every impinging impulse has become worn. Since under normal conditions of life, requiring constant adjustment to the external and internal environments, requiring motion and the maintenance of the erect posture, so many impulses from so many sources are constantly impinging on the motoneurons, in all segments of the cord, that those which are already facilitated, as in the lesioned segment, will inevitably be more active than the other. The muscle fibers to which they are connected will then be excessively high in tone. If maintained for sufficient periods of time this hypertonus would lead to textural, morphological, chemical, and metabolic changes which may, in turn, become secondary and chronic sources of irritation.

Other Neurons.—We have thus far discussed only the motoneurons and alterations in motor reflex activity in areas of lesion. What of the other efferent nerve fibers and the organs and tissues which they innervate?

Our experimental studies have demonstrated that closely and quantitatively correlated with lowered motor reflex thresholds are three other features of the lesion: (1) Alteration in the texture of the tissue overlying the spinous process, (2) lowered pain threshold, and (3) increased susceptibility to trauma.

1. Tissue texture: As is well known to osteopathic physicians, there are striking changes in the texture of the tissues over the spines of lesioned segments. It was found that the degree of change in tissue texture was so closely related to the degree of lowering of motor reflex threshold from the normal that Denslow, through palpation of subjects prior to each electromyographic determination of reflex threshold, was able to predict with remarkable accuracy the reflex threshold of each segment.

It is probable that these changes in texture are due to local changes in vasomotor activity, fluid balance, capillary permeability, trophic factors, and other features which are directly or indirectly under the influence of the lateral horn cells of the sympathetic nervous system.

2. Pain threshold: A direct correlation was found between motor reflex threshold and segmental sensitivity to pain. As is well known, the spines in lesioned segments are much more tender than those in normal segments. In other words, it is easier to reach the "consciousness" of the patient, i.e., the cerebral cortex, through the lesioned segment than through the nonlesioned. This, we interpret as signifying a facilitation of the spinothalamic fibers.

3. Susceptibility to trauma: It was found that if one applies equal mechanical irritation (measured impacts) to the spinous processes of lesioned and nonlesioned segments, the former may remain painful for several days, whereas the subject soon forgets which of his normal spines received the pounding.

We may conclude from these correlations with motor reflex threshold that neurons other than the anterior horn cells may also be facilitated and maintained in a state of hyperexcitability in the lesioned segment. This appears to be true, at any rate, of certain of the preganglionic fibers of the sympathetic nervous system and of the spinothalamic fibers conveying pain sensation to the higher centers.

Experiments are now in progress to establish the degree of involvement of neurons of the sympathetic nervous system. Dermatomal alterations in sweat gland activity are being determined by measuring the electrical conductivity of the skin in lesioned and nonlesioned segments. We are measuring alteration in the activity of sympathetic fibers controlling vasomotor activity by electrical measurements of skin and deep muscle temperature. Although these studies are still in a preliminary stage, it has become evident that sympathetic activity in the skin is altered in lesioned areas and that instruments used for the measurement of these peripheral changes, and others which are contemplated, will in one form or another become valuable diagnostic aids. They are much more sensitive than fingertips and certainly easier to standardize.

There is no reason to doubt that lateral horn cells which influence specific visceral functions are fundamentally similar to those controlling the sweat glands. A project, in collaboration with Dr. D. E. Drucker of the Department of Physiology, is under way for the objective and precise determination of alterations in various visceral functions resulting from acute experimental spinal lesions in animals. The effects on visceral function, in normal unanesthetized dogs, of lesions in segments related to the viscus under examination will be compared with the effects of similar lesions elsewhere. At present, these investigations are limited to a study of renal blood flow, glomerular filtration, and tubular secretion. The kidney was selected for the first such investigation because methods for quantitative study in normal animals and humans are highly developed and because of the clinical significance of renal blood flow and renal metabolism in connection with such entities as hypertension. Similar studies upon other visceral organs are projected for the near future. It is hoped that from these studies will emerge a clearer understanding of the relations of the osteopathic lesion to visceral disease.

CHARACTERIZATION OF THE LESION

On the basis of the experimental studies so far, I believe we are ready to attempt a characterization of the osteopathic lesion in terms of basic neural mechanisms. Let us first summarize our general conclusions.

1. Normally, efferent neurons are kept from firing in response to every impulse that reaches them by the fact that a relatively high level of subliminal excitation—or facilitation—must be established, by other impulses converging upon them, before the firing point is reached. This requirement serves as a sort of insulation.

2. In the lesioned segment this insulation has been weakened. A large portion of the efferent neurons are kept near the firing point (facilitated), even under conditions of rest, by chronic afferent bombardment from segmentally related structures.

3. Proprioceptors are undoubtedly an important source of this bombardment, but any segmentally related structure may be such a source. A pathological viscus, or a cutaneous trigger spot, or any other inflamed or irritated structure which concentrates its afferents in one or a few dorsal roots may be responsible for more or less tonic facilitation. (The close relation of the osteopathic lesion to referred pain mechanisms is clear, but space does not permit a discussion of this most important aspect.)

4. The firing process in the facilitated efferent neurons may be completed by any impulses impinging on those neurons, whether the source of those impulses be the cerebral cortex, postural and equilibrium centers, bulbar centers, cutaneous receptors, or others. Should this superimposed bombardment be sufficient and enduring, the facilitated neurons (and the organs they innervate) may be maintained in a continuous state of excessive activity.

5. The state of facilitation may extend to all neurons having their cell bodies in the segment of the cord related to the lesion, including the anterior horn cells, preganglionic fibers of the sympathetic nervous system, and apparently the spinothalamic fibers.

6. Because a structural defect, an osteopathic lesion, sensitizes a segment to impulses from all sources, and for reasons previously given, the lesioned segment is to be considered not a radiating center of irritation, but rather a neurological lens which focuses irritation upon that segment. Because of the lowered barriers in the lesioned segment, excitation is channelized into the nervous outflow from that segment.

7. It is a truism in neurophysiology that when something is excited, something functionally related is simultaneously inhibited. Although in our studies we have not yet directed attention to this aspect, it cannot be doubted that facilitation in the segment of lesion also extends to neurons exerting inhibitory influences upon other neurons or organs.

It may then be concluded that: *An osteopathic lesion represents a facilitated segment of the spinal cord maintained in that state by impulses of endogenous origin entering the corresponding dorsal root. All structures receiving efferent nerve fibers from that segment are, therefore, potentially exposed to excessive excitation or inhibition.*

MANIPULATIVE THERAPY

We come now to the last question: What, basically, does manipulative therapy do? Here, we can only guess, but at least our guesses are based on sound, experimentally established hypothesis.

Manipulative procedures applied by osteopathic physicians induce relaxation of muscle which has been maintained in a continuously contracted state and which, as a matter of fact, may not be able to relax spontaneously, even when excitation is removed (contracture). The increase in muscle-fiber length eases the tension on the proprioceptors in the muscles and tendons, bringing about at least a temporary diminution in afferent bombardment of that segment of the cord.

Since the excessive tendinous and muscular tension produced around a joint, let us say, by some bony displacement tends reflexly to produce more tension, the manipulative easing of tension breaks a vicious cycle.

Still another type of vicious cycle may be in operation and be broken by manipulative therapy (Fig. 1). Through overexcitation of sympathetic fibers in the segment of lesion, visceral pathology may be established. The anterior horn cells may then be subjected to additional bombardment with impulses conveyed by visceral afferents, thus causing exaggeration of the somatic lesion which, in turn, further irritates the viscus. Manipulative relaxation of the muscles may break this cycle, too, through diminution of proprioceptor discharge into the cord. Even a brief respite from this irritation allows better opportunity for the natural healing processes to operate.

By manipulative rearrangement of the skeleton and through postural adjustments, the original cause of the strain, that is the excessive tension on muscles, tendons, and ligaments, may be eliminated and the beneficial results made more lasting.

This is unquestionably an oversimplified version of the basic effects of manipulation, but it certainly will serve as a working hypothesis, as a guide to further experimental investigation.

SPECULATIONS

Assuming the importance of the proprioceptors in the lesion mechanism, it must be kept in mind that any segmentally related structure which sends afferents to the spinal cord may be an important participant in the establishment or maintenance of the lesion. In fact, through the network of interneurons, practically any afferent, segmentally related or not, may exert some influence.

To all these sources of impulses must be added the suprasegmental sources—all the higher centers, from medulla to cerebral cortex—which contribute to the descending spinal tracts. Many of these are continuous and highly variable sources of impulses. They exert their influence—excitatory or inhibitory—upon efferent neurons at every level of the spinal cord.

It is, indeed, most important to keep in mind that the efferent neurons do represent final common paths shared by a host of impulse sources, in addition to those associated with joint and supporting tissues. In this light, it is apparent that the articular derangement or the osteopathic lesion cannot be conceived as the *cause* of disease; rather it is one of many factors simultaneously operating.‡ The lesion is a most important factor—it is a sensitizing factor, a predisposing factor, a localizing factor, a channelizing factor. The lesion sensitizes a segment of the cord, lowers the barrier, facilitates—without necessarily producing symptoms, although signs of its presence may be demonstrated by the osteopathic physician. Sufficient additional excitation has to be superimposed upon that from articular and periarticular origins. This is not to minimize the importance of the osteopathic lesion. On the contrary it is to widen the concept. For one thing, it certainly points up the tremendous contribution that osteopathic diagnosis and therapy can make to preventive medicine.

To osteopathic physicians there is, of course, nothing unfamiliar in the practical aspects of this concept. One patient has relatively severe lesions, yet is symptom-free, pain-free, and not readily subject to fatigue, etc; another patient with very similar lesions, on the

‡In fact, it is doubtful whether there is ever a single cause of any effect, whether there is ever an isolated etiological factor in any clinical entity. Each factor operates in the context of many factors and produces certain effects only in a certain combination of factors.

other hand, may be subject to serious disturbances directly related to those lesions. Further, the lesions of the first patient may "act up" under certain circumstances, and then subside into "quiescence" again. Why? What accounts for the difference between such patients, and between the "acting-up" and "quiescent" periods in the same patient? In our opinion and, I believe, implicit in the osteopathic concept, one important basis for the difference lies in differences in the amount of nervous excitation continously impinging on the efferent neurons of the lesioned segments, over and above that from the muscles and joints. The lesion operates in different contexts with different effects.

Given an articular disturbance which, through the mechanisms discussed above, determines the *location* of the low threshold segments, then the severity of the lesion, the associated pathology, and the response to treatment will be to a great extent, often to a decisive extent, determined by how much additional neuron pressure from other sources is chronically present. Such pressure may be present upon all the segments, but because of lowered synaptic barriers, the effects will be exaggerated at the lesioned segment. The lesion not only focuses; it magnifies.

This superimposed excitation may come from any of the sources previously enumerated, and others, which converge upon the anterior horn cells and the other efferent neurons: the cortex, the basal ganglia, cerebellum, vestibular nuclei, bulbar center, the eyes (via the tectospinal tracts), or any steady, tonic source of impulses.

Since all these sources may directly affect, favorably or unfavorably, the lesion and its associated phenomena, they are all properly within the province of the osteopathic physician. All of them may contribute to the lesion and to its effects on total body economy. Important as is the structural factor, treatment of it alone is not to treat the patient as a whole and would be, if I interpret it correctly, a corruption of the osteopathic concept.

I shall try to illustrate with one source of bombardment which is of very general significance, namely, the cerebral cortex. As previously indicated, the words "tense," "high-strung," "jumpy," "keyed-up," "on edge" are more than figures of speech. They bespeak the well-recognized fact that psychic stress, emotional imbalance, environmental strains, etc., influence and are reflected in motor activity—an increased muscular tone and hyper-responsiveness, in generally lowered reflex thresholds. A familiar illustration is the exaggerated knee jerk of a tense individual. (Other types of imbalance may, of course, have depressing or inhibitory effects, resulting in fatigue, hyperreflexia, inertia and other symptoms.)

These are obviously due to impulses passing down the descending spinal tracts and impinging, directly or through interneurons, on the anterior horn cells and increasing their excitability and activity.

In a segment already sensitized by an osteopathic lesion the effects will be especially severe. Just as important is the fact that descending impulses may exacerbate the lesion and produce increased effects on segmentally related organs, may cause or intensify pain, and make the lesion less responsive to manipulative therapy. To treat only the structural source of bombardment is only to half-treat and to neglect a most important part of the lesion mechanism, and to take the lesion out of context. This does not mean, of course, that every osteopathic physician should become a psychiatrist, but he certainly must take into consideration the home factors, environmental factors, family relations, emotional adjustments, tensions, etc.

In this light the as yet unexplored relations of osteopathy to psychosomatic medicine become obvious. It is now well established that many organic ills, including angina pectoris, gastric and duodenal ulcer, gallbladder disease, mucous colitis, asthma and others, may be directly related to psychoneuroses, emotional imbalances, and anxieties. What factors determine the organic manifestation of the neuroses? The autonomic nervous system, of course, has regional representation in the cerebral cortex and the hypothalamus is under cortical influence. It has been thought that the unconscious may select the organ or organs to be affected. Without prejudging these and other theories, it would seem most profitable, clinically and experimentally, to explore the probability that the incidence and location of osteopathic lesions may be an important factor in determining the incidence and nature of psychosomatic ills. Certain aspects of this hypothesis are under experimental investigation in the Kirksville laboratories.

SUMMARY

1. Some of the neural mechanisms involved in the osteopathic lesion, in its local and distant effects, and in manipulative therapy are examined.

2. The results of experimental investigations are presented which indicate that the lesion is associated with a segment of the spinal cord which is hyperexcitable to all impulses which reach it, and that the hyperexcitability may extend to any neurons having their cell bodies in that segment.

3. It is concluded that osteopathic lesion represents a facilitated segment of the spinal cord maintained in that state by impulses of endogenous origin entering the corresponding dorsal root. All structures receiving efferent nerve fibers from that segment are, therefore, potentially exposed to excessive excitation or inhibition.

4. Evidence is presented that the stretch and tension end-organs (proprioceptors) in the muscles and tendons are the most important source of afferent impulses which produce the changes in the cord that are associated with the osteopathic lesion.

5. The effect of the lesion as a predisposing and localizing factor is emphasized and discussed in relation to certain aspects of osteopathic practice.

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REFERENCES

1. Denslow, J. S.: An analysis of the variability of spinal reflex thresholds. J. Neurophysiol. 7:207-215, July 1944.

2. Denslow, J. S.; Korr, I. M., and Krems, A. D.: Quantitative studies of chronic facilitation in human motoneuron pools. Am. J. Physiol. 105:229-238, Aug. 1947.

3. Lloyd, D. P. C.: Intercellular transmission, in Howell's Textbook of physiology, edited by J. F. Fulton. Ed. 15. W. B. Saunders Co., Philadelphia, 1946, p. 134.

4. Sherrington, C. S.: Correlation of reflexes and the principle of the common path. Brit. Assoc. Rep. 74:728-741, Aug. 18, 1904; abstr., Brit. M. J. 2:443, Aug. 27, 1904.

5. Lorente de Nó, R.: Synaptic stimulation of motoneurons as a local process. J. Neurophysiol. 1:195-206, May 1938.

6. Lloyd, D. P. C.: Reflex action in relation to the pattern and peripheral source of afferent stimulation. J. Neurophysiol. 6:111-119, March 1943.

Certain Cardiac Complications and Vertebral Lesions

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The collection of satisfactory clinic records is difficult, chiefly because neither patients nor doctors are infallible. Patients may forget or may deny incidents important in etiology. No two institutions and rarely any two physicians agree as to what information should be included in a case record, nor do they agree on any uniform method of using laboratory findings.

During the past year more than 3,000 case records have been studied in a search for some satisfactory method of determining the place of vertebral lesions in etiology. Different methods of examination and varying phraseology used by different osteopathic physicians and institutions necessitate a classification based on the origin of the records. The fact that persons almost always suffer from several pathogenic conditions necessitates a classification based on definite group pictures rather than on single diseases or single causes of disease.

We found evidence of heart disease or of cardiac dysfunction in nearly 2,000 case records. In a very few of these cases was any single cause of disease present. A combination of rheumatic or other infection, usually pyogenic, was associated with some other cause of cardiac disorder in a large number of cases. Similar infections were present in a considerable number of cases in which no evidence of cardiac disorder could be found. These facts suggested a study to determine the relative incidence of cardiac disorders in persons with these infections and also with vertebral lesions supposed to affect the heart, and in persons with the same infections but without these lesions.

After consultation with osteopathic physicians in practice and a study of records of experiments on animals, it was decided that the "lesions supposed to affect the heart" include occiput, atlas and axis lesions which affect cardiac rhythm, and third and fourth thoracic and neighboring lesions, which disturb cardiac circulation and cause definite myocardial pathology.

It is obvious that a case record useful in this study must include a description of the entire spinal column and the ribs and an account of the findings on a fairly complete physical examination in which the condition of the heart, pulse, and blood pressure is included. An account of the patient's complaints, history, and the results of all other examinations made in determining the diagnosis and treatment usually are fairly complete in all accessible case records.

RECORDS STUDIED

We found 230 case records in which rheumatic and other infections were present and supposed to be important in causing the patient's complaints, and which included also a description of the spinal condition and a fairly complete physical examination, including the patient's age, blood pressure, pulse, heart sounds, and data which indicated the location of the inflammatory processes. These records include the information required by this study though they may not meet all the specifications of ideal case reports. The group includes 166 records from the files of the Bondies Sanitarium and 64 records from other sources in which the same examinations and records were made.

Each patient suffered from some chronic infectious process and related symptoms, such as rheumatic or neuritic pains, weakness, and malaise. Usually several sites were concerned in the inflammation.

The youngest patient was 22, the oldest 91 years old. The average age of the group was 52 years.

Colitis was present in 181 cases. Endamoeba histolytica was found in 62 of these patients. Pyogenic foci also were present in these cases. Parasites of doubtful pathogenicity were abundantly present in 8 cases. Other infectious organisms included various streptococci and encapsulated bacilli whose pathogenicity has been often questioned. Isolation of the infectious agent was not always possible, and is not necessary for the purpose of this study. The fact that a purulent discharge or an accumulation of pus was found indicates that some pyogenic agent was present and active.

Pyogenic dental infection was present in 132 patients with colitis.

Chronic tonsillitis with mucopurulent discharge was present in 33 cases. Each of these patients suffered also from some gastrointestinal pathology.

Gastric or duodenal ulcers were present in 7 cases. In each of these either dental or tonsillar pyogenic foci also were found. One patient with early gastric carcinoma was treated by surgery. Dental abscesses and colitis received adequate treatment after the operation. The patient is now in good health, 11 years later.

In 2 cases valvular lesion of the heart, hypertension, and chronic nephritis, together with dental and tonsillar infections, were present.

In one case each, uterine fibroid, chronic bronchitis, hives, gallstones, purulent cholecyctitis, pulmonary tuberculosis, and hydronephrosis were found.

In 160 cases arthritic symptoms were present. These included articular pain with redness of the skin over the joint, arthritis deformans of varying severity, rigidity of a few or many joints without pain, and various mild atrophies or hypertrophies of joint tissues.

In 148 cases extra-articular rheumatic or neuritic pain was noted. In 88 cases muscular pain and weakness were fairly severe. Conditions called sciatica, lumbago, and neuritis are included with these.

In 220 cases vague digestive symptoms, rarely very severe, were mentioned among the patient's complaints. These included nausea, lack of appetite, constipation or diarrhea, gastric and abdominal pains.

CRITERIA

It has been noted that each of the records in this group includes a description of the spinal lesions present. Since we have found, in both animal and clinical records, that the site of the lesion rather than the exact structural relations of maladjusted tissues determines its pathogenic influence, we have omitted complete descriptions. Criteria for the existence of a lesion included palpable bony maladjustment, disturbed sensation of the tissues near the lesion, and palpable changes (tension, edema, contraction or contracture) in the deep spinal muscles near the lesion.

It has been noted also that occiput, atlas and axis lesions disturb the rhythm of the heart, and that third

and fourth thoracic lesions cause definite myocardial pathology as well as certain changes in the pulse. Lesions of adjacent tissues cause cardiac symptoms which are less severe and less constant than do the vertebral lesions mentioned.

In these records the relative efficiency of the heart is indicated by the pulse, the pulse pressure, the electrocardiogram, the findings on physical examination and by the results of various tests which were used and discarded as indicated by advances of our knowledge of the physiology of the heart and the circulation. These tests varied during the years and in this report the findings are considered corroborative rather than conclusive.

In living patients it is not possible to determine the severity and extent of cardiac pathology even when some abnormal condition seems to be recognized on physical examination. This is shown by the frequency with which abnormal conditions, unsuspected during life, are found at autopsy, and also by the fact that pathological conditions indicated by antemortem examinations may not be found at autopsy. In this study the term "cardiac symptoms" includes two or more of the following findings: Abnormal valvular or muscular sounds, abnormal size of the heart as indicated by x-ray plates or by physical examination, abnormal pulse pressure or abnormally low systolic pressure, disturbed cardiac rhythm not due to recognizable external conditions, abnormal quality of the pulse beat. In no case was only one of these findings noted and in several cases three or more indications of cardiac disturbance were found.

In no patient of this group was the spinal contour normal. Since every patient suffered from some chronic infectious process, this finding is not surprising. It is not possible, in this group, to determine whether the lesions, or any given lesion, antedated the infection.

Occiput, atlas, and axis lesions may be grouped as upper cervical lesions. In animal experiments the effects of any one of these, or of any combination of them, are alike. Third to sixth cervical lesions, alone, were not found in this group. Seventh cervical to fifth thoracic lesions may be grouped as upper thoracic lesions. Third and fourth thoracic lesions in animals were found to cause uniform pathological changes in the myocardium. The first, second and fifth thoracic lesions were found to cause similar but less constant and less severe myocardial changes.

In this report of human cases lesions below the fifth thoracic segment may be grouped as lower spinal lesions, since cardiac changes have not been found to be directly due to such lesions. It is true that the heart may be indirectly disturbed by lesions affecting abdominal viscera, but usually these cases are easily recognizable. No such case was found in this group.

Some abnormal condition of the lower thoracic and lumbar spine was found in each case. In three cases, rigidity only was present. Abnormal tension (either contraction or contracture) of the deep spinal muscles alone appeared in 9 cases. Short curves or specific lesions were present in 218 cases. A difference in leg length or an innominate lesion was noted in 16 cases, and lower lumbar lesions were present in each of these.

SUMMARY

Upper cervical lesions, with no lesion of the upper thoracic region, were present in 32 cases.

Upper thoracic lesions, with no upper cervical lesion, were present in 48 cases.

Both upper cervical and upper thoracic lesions were present in 102 cases. The frequent association of upper thoracic and upper cervical lesions suggests the frequency with which atlas lesions in experimental animals are followed by secondary upper thoracic lesions.

Neither cervical nor upper thoracic lesion was present in 48 cases.

In 33 cases no upper cervical or upper thoracic lesion could be found, and no cardiac symptoms were noted.

In 15 cases no upper cervical or upper thoracic lesion could be found, while cardiac symptoms were recorded.

In 46 cases upper cervical and upper thoracic lesions were recorded, while no cardiac symptoms were noted.

In 136 cases upper cervical and upper thoracic lesions were recorded, and cardiac symptoms also were noted.

In other words, in this group of 230 patients suffering from chronic infections supposed to affect the heart, 151, about 66 per cent, showed cardiac symptoms while 79, about 34 per cent, showed no evidence of cardiac disturbance.

Of this group also, 182 patients showed spinal lesions supposed to affect the heart. In 136 of these cases, about 75 per cent, cardiac symptoms were noted, while in 46 cases, about 25 per cent, no evidence of cardiac disorder was found.

In 48 cases no upper thoracic or upper cervical lesion was found. Of these, 15 cases, about 31 per cent, suffered from cardiac symptoms, while in 33 cases, about 69 per cent, there was no evidence of cardiac disturbance.

Again, 151 cases showed a record of cardiac symptoms. Of these, 15 cases, about 10 per cent, did not show any record of lesions supposed to affect the heart. In 136 cases, about 90 per cent, upper thoracic or upper cervical lesions were recorded.

In 79 cases no evidence of cardiac disturbance was found. Of these, 33 cases, about 42 per cent, did not suffer from lesions supposed to affect the heart, while 46 cases, about 58 per cent, did suffer from such lesions.

CONCLUSION

These relations seem to indicate that vertebral joint lesions have a definite place in the etiology of cardiac disorders in patients suffering from chronic pyogenic infection.

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Editor's Note: Vertebral lesions referred to in this report are not exclusively joint lesions according to the writer's definition.

Tuberculosis of the Spine

Some Surgical Considerations

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This paper must not be construed as a thesis on the subject of spinal tuberculosis, nor must it be considered a comprehensive study of the condition. Rather, it attempts only to outline some of the more pertinent clinical and pathological aspects of the disease, and to draw some rational therapeutic conclusions based upon these factors, particularly as they pertain to the surgeon.

The long protracted period of treatment averaging from 2 to 5 years, followed by a still longer period of observation, and associated as this condition is with serious complications, and not inconsequential mortality of approximately 15 per cent of all types (and little above 40 per cent of those complicated by paraplegia), hurl a distinct challenge to the healing professions; particularly is this true in the face of the fact that during the last 25 or more years there have developed *no* substantial therapeutic advances.

The fact that this difficult condition constitutes from 2 to 3 per cent of all orthopedic cases and from 40 to 50 per cent of surgical tuberculosis indicates that it merits considerable attention on the part of the orthopedic surgeon.

The first consideration in approaching this problem must be directed toward the economic situation of the patient. A goodly percentage of patients afflicted will not be able to bear, unassisted, the financial burden associated with the prolonged private care necessary to combat this condition. It then becomes the responsibility of the physician to act as a counselor, not only relative to the medical aspect of the case, but likewise in arranging such institutional or nursing care that might be necessary, irrespective of the patient's financial circumstances. In the large metropolitan areas where tax-supported and endowed institutions are available, this problem is more easily solved, but in rural communities this factor sometimes presents a major problem, and the modus operandi of surmounting this problem may call upon all the ingenuity of the physician.

In directing one's attention to the consideration of spinal tuberculosis, it must ever be borne in mind that this condition is virtually the local manifestation of a systemic disease, and failure to evaluate adequately the entire patient might mean the difference between success or failure in treatment, not only of the local spinal condition, but also of the patient as a whole. The one cannot be divorced from the others.

In the child (and approximately 50 per cent of spinal tuberculosis develops in the child between 3 and 5 years of age), this condition is usually associated with a demonstrable active lesion elsewhere in the body; whereas, in the adult, evidence of such active lesion may be lacking, the bone disease having occurred as the result of metastasis from a latent focus in the lymphatic structures, a residual manifestation of a pulmonary tuberculosis of earlier life.

It would appear relatively universally accepted that tuberculous osteomyelitis is a metastatic process arising hematogenously from a primary focus elsewhere, although it is not completely without the realm of possibility that direct extension from the lymphatics by way of the thoracic duct may not be the mode of entry in some cases. Trauma to bone is not considered a direct cause for the production of this disease, but may be a factor in reducing the local resistance of a bone to infection by a tuberculous bacteremia, or may, perhaps, lead to the reactivation of a dormant lesion. The lesions in the spine occur most frequently in the bodies being anterior peripherally, or centrally located or appearing first in the epiphyseal areas. Much less frequently the original lesion is located in the posterior division of the segment. These areas of predilection are consistent with the local vascular entry to the spinal segment.

The local pathological sequence of this condition begins as a tuberculous endarteritis producing an ischemia with subsequent devitalization of the marrow. This devitalized material forms a rich culture medium for the proliferation of the tubercle bacillus. As the tuberculous activity progresses, there is a rarefication and "melting" of the trabecular bone with caseation. The progress of this results in a vertebral body consisting of a fragile shell of compact bone enclosing a semifluid detritus consisting of caseous matter, disintegrated bone lamella and marrow, sequestra, and reparative granulations, but no new bone formation, for as Girdlestone[1] so beautifully expresses it, "osteogenesis does not occur except at a distance in time or in space from an active tuberculous lesion."

The final mechanical result of this destructive process of the vertebral body, particularly in the thoracic area, is collapse, produced by the static force of the superincumbent weight of the body above the involved area, thus producing the typical kyphotic deformity. When this collapse occurs, the tuberculous detritus is extruded into the paravertebral tissues thus laying the foundation for the typical "cold" tuberculous abscess, and for the further extension of the process to adjacent vertebral segments, if such extension is not already in progress from the original or secondary vascular showers. With this abscess formation or collapse, we have set into motion the mechanism for the production of one of the most serious complications of this disease, that of compression paraplegia, which occurs in about 11 per cent of those patients afflicted with spinal tuberculosis.

This compression may be caused by the extension of an abscess around the body of the vertebra to the canal or rupture through the postlongitudinal ligament, or as the result of a pachymeningitis or leptomeningitis produced by extension of the inflammatory process to the meninges. It might be the result (fortunately in only a small percentage of cases) of direct bony pressure on the cord produced by angulation, pathological dislocation or impalement by sequestra (or in the later stages of repair by exostosis).

From a therapeutic standpoint it is most essential to attempt to determine whether or not the paraplegia is the result of soft tissue compression or bony compression, because in the former eventual spontaneous recovery under conservative care is the rule, whereas in the latter surgical relief of pressure is most often mandatory.

Inasmuch as compression paraplegia is *the* complication of spinal tuberculosis wherein surgery may mean the difference between life and death, it would appear pertinent at this time to discuss this problem in some detail if not at length. Surgery here, when indicated, is unquestionably a life-saving procedure, and just as surely surgery performed when contraindicated in this condition may be tantamount to the signature of a death certificate.

Turning back to our discussion of pathology, we observe that paraplegia is caused by soft tissue invasion of the spinal canal or by bony pressure. In the first instance this soft tissue invasion will probably be due to progressive abscess formation or granulation exuberance, and the compression thus produced is gradual and soft. It follows, then, that the symptoms would likewise be insidious in their onset and progress. They are first characterized by tired and stiff limbs, associated with an insecure and stumbling gait, followed by rigidity and spastic paralysis. This spastic paralysis is one of extension during the earlier stages and when complete cord involvement is not present. While the condition remains in this state, the disturbance is primarily functional as a result of the meningeal compression producing blockage of the lymphatic flow and creating a secondary edema of the dura or arachnoid with pachymeningitis or leptomeningitis, and when the pressure is relieved as the process resolves, there is a reversal of the compression symptoms and function returns.

However, if the compression factors remain in operation long enough, or with sufficient force, there will eventually develop complete involvement of the cord, at which time the spastic paralysis changes from one of extension to one of flexion and as time passes, cord degeneration occurs with reactive inflammation and subsequent irreversible sclerosis. The signal of impending cord degeneration is the alteration of the spastic paralysis to one of flaccidity, which is frequently associated with perverted sphincter control.

It would appear, then, from the preceding pathological summary that so long as the paraplegia is spastic in extension, there is no reason to submit the patient to a surgical procedure for the relief of cord pressure; likewise, the alteration from spastic paralysis in extension to spastic paralysis in flexion is not an indication for immediate surgery, but is a warning to the surgeon to be ever vigilant, for should such flexion be maintained for a prolonged period, irreversible cord damage may ensue. A general rule may be propounded that any spastic paralysis in flexion that continues unabated for a period of several months is an indication for the relief of pressure before permanent cord damage occurs, or that any time during the observation of this condition, there is an alteration of the character of the paralysis from that of spasticity toward that of flaccidity, immediate pressure-relieving surgery be performed.

Paraplegias produced by direct bony pressure are in the distinct minority, and occur in but a small percentage of cases. The paraplegia is due usually to a sudden collapse of vertebral body with gross angulation, or to a pathological dislocation, the final result of a tuberculous destruction of the articular mechanism, or collapse with overriding of the facets, or to the impalement of the cord by sequestra. As would be expected, the onset of this type of paraplegia is usually dramatic in its rapidity and disturbing in its completeness, and therefore most usually requires immediate surgical relief.

There is, however, one type of paraplegia of sudden onset in which surgery is of no avail, and consequently contraindicated, and that is acute thrombosis of the cord. This condition must always be ruled out, or the enthusiastic surgeon may find himself operating upon a patient who can ill afford the insult of useless surgery.

The complication of abscess formation probably occurs at some time during the course of the disease in almost 100 per cent of cases, and can be clinically demonstrated in 25 to 30 per cent. This complication without paralytic symptoms need not necessarily be alarming. Indeed, by far the greatest number remain pyogenically sterile and localized and spontaneously disappear under conservative care, as the general treatment of the patient continues. However, there are those instances when by virtue of its location and size, an abscess may assume lethal proportions by direct pressure on some vital structure such as the retropharyngeal area or the mediastinum. When such instances occur, the removal of the abscess material becomes imperative. Extensive abscesses may gravitate to areas considerably distant from the original focus and present themselves subcutaneously. It cannot be too forcefully stressed that as long as such an abscess is not causing dangerous pressure symptoms, it should be ignored therapeutically unless it appears that spontaneous rupture to the surface is imminent. Under such a condition, the purulent material should be removed, such removal being accomplished by aspiration under surgical aseptic technic. The aspirating trocar should be introduced through the skin at a distance from the most prominent point of the abscess, and traverse some distance through healthy tissue before entering the abscess cavity; following the aspiration, the skin wound should be sealed and dressed. Should the fluid be too viscid for aspiration, incision and drainage may be performed following the same precautions and route in entering the cavity as described previously. Following the removal of the purulent material, the incision should be closed in layers. Open drainage of a tuberculous abscess should never be permitted as secondary infection practically always occurs, and a permanently draining cavity and sinus will be the final result. It is possible that in the future penicillin and similar chemotherapeutic measures may modify this dogmatism, but in the light of present knowledge, there should be no variations from this technic.

The management of Pott's disease, as far as this paper is concerned, will not consist of a resumé of the literature, but shall be based entirely upon rationale evolved by the study of the preceding portions of this article.

We have noted that Pott's disease is a metastatic manifestation of a systemic disease; it would then appear imperative that the first consideration should be directed toward the "system" in an attempt to bring under control the focus responsible for the metastasis. It would not appear logical to treat a local metastatic area without attempting to eliminate the source of further metastases. We know that absolute rest, nourishing diet, fresh air, heliotherapy, etc., are prime requisites in the treatment of general tuberculosis, and are likewise fundamental in the treatment of the local condition. We further observe that vertebral collapse and deformity with gibbus formation is the usual mechanical manifestation of this disease. To treat this

mechanical problem logically, we should analyze rather thoroughly the mechanism of the kyphos. With the collapse of one or more vertebral bodies there is produced a local angular deformity. The vertebral segment may be likened to a beam balance with the articular facets acting as the fulcrum and the body of the vertebra as one arm of the balance, and the posterior arch and spinous process the opposite arm. As the bodies collapse anteriorly and become impacted, the articular facets, acting as a fulcrum, cause the spinous processes to become divergent. At the same time there is an associated diastasis of the articular facets. If the collapse becomes severe, the articular facets of the vertebra above become levered over those of the vertebra below, and dislocation occurs. A similar dislocation can also be produced, though rarely, in the absence of gross collapse, by the tuberculous destruction of the articular facets themselves.

The process of repair of this tuberculous destruction is unhurried and unhurriable. Once tuberculous activity has ceased, the young patient, because of the inherent osteogenetic capacity of growing bone, will generally create an eventual osseus fusion; whereas, in the adult, repair is more frequently accomplished by fibrosis only. These facts would indicate that from a mechanical standpoint alone, the juvenile spine contains within itself the ability to regenerate a solid structure; whereas, the adult spine will probably require outside assistance, and that such assistance will be most satisfactorily supplied in the form of some type of autogenous bone graft. The question then arises, when should such grafting be performed? There is no question where Albee[2] stands in this respect. He makes the statement that it has been his practice, provided the surgical risk was good, to operate on any patient at any age, irrespective of the phase of tuberculous activity either locally or systemically, and he is a strong advocate of early fusion, believing that the absolute immobilization of the spine produced by fusion hastens the repair process and lessens the frequency and severity of complications, and reduces the period of absolute bed care from a period of years to a period of months. It must be remembered, however, that fusion of the spine does not cure Pott's disease, that it is purely a mechanical device, palliative for the relief of symptoms early in the disease, and an additional structural support late in the process. It would appear logical, then, in face of all that has preceded, that once a diagnosis of tuberculosis of the spine has been established, the patient be placed at complete rest in such a manner and in such a position that he can be treated by sunlight or lamp, diet, fresh air, etc., and at the same time protect the spine and prevent the development of deformities and complications.

It is obvious that systemic tuberculosis will require relatively prolonged bed rest (irrespective of the spinal condition), and it would then seem logical to devote an adequate portion of this time to conditioning the patient before surgery, not only to produce an improved surgical risk, but also to reduce the activity of the primary focus with the object of eliminating tuberculous bacillemia, thus decreasing the possibility of reactivating a healing spinal lesion, or the production of other metastatic areas; it is an established fact that x-ray may reveal destruction of only one or two vertebral bodies, whereas, autopsy on the same patient will prove that four or five more segments are involved.

There are many methods of treating these patients during this "observation period." However, the two most desirable are by the Whitman frame or a modification thereof, or the bivalved plaster cast. The latter would appear to have some distinct advantages. First, a complete cast is applied and then bivalved into an anterior and posterior shell. This permits the patient to be placed dorsally recumbent or prone and a change from the one to the other is simply accomplished by strapping the cast together during the turning process. This permits better nursing and better skin hygiene. It permits the use of complete body heliotherapy and combats stasis, particularly in the kidneys which frequently become a major problem in the adult. It likewise permits periodic complete examination of the patient for the development of complications and reduces the hazards of decubitus. This observation period should be continued until there is evidence to show that (1) the general tuberculosis is under control; (2) there is little likelihood of further vertebral extension; (3) the acute local symptoms are subsiding; (4) the deformity shows a tendency toward improvement rather than accentuation. The absolute elimination of the deformity is not required, nor is it therapeutically desirable. To overcome the deformity completely predisposes the separation of the vertebral bodies, and to do this disrupts the process of repair and weakens the spine by preventing what spontaneous ankylosis might otherwise develop.

If adequately and vigorously treated during this period, only a few months of time need elapse in the majority of cases before surgical fusion may be performed judiciously.

There are several technics available for surgical fusion, and each has its place. The most rapid and easily performed is that originated by Albee[2], and in the child this probably is the procedure of choice. Massive surgical fusion is not necessary as the juvenile almost always spontaneously reproduces bony fusion of the bodies. In the adult, however, where the end result of repair is primarily by fibrosis only, the more extensive fusion accomplished by combining the technic of Albee with that of Hibbs would appear more certain. The writer is most enthusiastic relative to the value of graft material derived from the crest of the ilium for the Hibbs' portion of the fusion. Irrespective of the method used, it must be remembered that there may be more vertebral segments involved by the disease than is revealed by the x-ray, and *at least* two segments above and below the demonstrable areas should be included in the surgical fusion. If there are several segments visibly involved, this means that surgical fusion may be required of seven or eight vertebræ, and if such is the case, a two-stage operation may be necessary, if the patient cannot withstand the shock of an extensive one-stage procedure.

The aftercare of the patient undergoing fusion operation is just as important as the surgery itself, and adequate period of recumbency in plaster is essential. First, this recumbency is required to permit a solid "take" of the graft, for it must be remembered that surgical fusion for tuberculosis differs materially from those fusions for stabilization of a nondiseased spine. Where the spine is not collapsing, only a small portion of the weight stresses are thrown upon the graft, but in tuberculosis with the progressive kyphotic formation, there is strong leverage produced upon the grafted area and if this is not combated by recumbency for an

adequate period, there will be a stress atrophy of the graft with eventual pseudarthrosis.

The insult of rather extensive major surgery will certainly lower the patient's general resistance; the tubercle bacillus, which is ever an opportunist, may become reactivated to a greater or lesser degree, and must be treated accordingly. If there is demonstrable active pulmonary or systemic tuberculosis, the internist will insist upon recumbency until inactive and there is no question of the time element; however, in those patients (particularly adults), where no demonstrable active lesion is present (apart from the spine), one may be lulled into a sense of false security. The physician must never fail to remember that many a spinal tuberculous condition has developed from an active focus that was never demonstrable, and the postoperative patient should be given the benefit of the doubt. It is much better to err on the side of too much, rather than too little rest, and if we prepare to treat our patients based upon a study of the pathology as outlined, it will be the rare patient that should be permitted ambulation in less than a few months following surgical fusion. It seems hardly necessary to mention that postoperative casting will be continued for several months following surgery, and that subsequent to that a brace will be necessary for many months, if not years. Following this outline of recumbency—surgery—recumbency, the patient's confinement to bed in the uncomplicated case will be less than half the time required by simple recumbency alone, and a most satisfactory end result should ensue. In those cases applicable, there appears no age contraindications to spinal fusions except perhaps the infant below 5 years, and the aged, where Pott's disease is a rarity.

A word of warning, at this time, might be justified relative to a complication of tibial graft removal that is rarely mentioned in the literature, and that is one of thrombophlebitis. This condition should always be looked for and if present, the procedure of vein ligation should be given serious consideration, because of the hazard of lethal pulmonary emboli. A patient with positive signs of thrombophlebitis who develops an acute pulmonary episode, no matter how mild, should have *immediate* ligature of the involved vein.

Whereas the surgery of spinal fusion may be considered elective, and purely an aid to treatment, surgery for the relief of some of the complications of this condition is frequently essential for the preservation of life. We have previously discussed at some length compression paraplegia, its etiology and indications for surgical intervention. It now behooves us to determine just what procedures shall be utilized, and in determining these procedures, we necessarily must consider once again the mechanics of the gibbus formation, because wherever possible, the integrity of the supportive structures of the spine should be jealously preserved, and no procedure should be utilized which would later prevent adequate surgical stabilization, should such a procedure become necessary.

On the other hand, we find it difficult to rationalize, from a pathological standpoint, the philosophy of those adherents of spinal fusion as the treatment of choice for *all* compression paraplegias, based purely on the rather dubious assumption that such paraplegias will eventually disappear when the local tuberculous activity is brought to a halt. Rather, we would prefer to establish as accurately as possible, the pathological process producing the paraplegia, observe its progress and then, if surgical intervention appears necessary, institute such procedures as are indicated to combat the pathology producing the symptoms.

If the paraplegia is of the soft tissue type and if x-ray can demonstrate an obvious abscess under pressure, it is safe to assume that relief of pressure by drainage of the abscess will eventually result in the alleviation of the paralytic symptoms. Inasmuch as most paraplegias arise from dorsal involvement (occasionally from cervical and rarely from lumbar) the technic of choice here is approaching the abscess by costotransversectomy, a procedure that in no way weakens the spine. It permits evacuation of the abscess *away* from the spinal cord and leaves the spinal column in such a condition that if necessary, later fusion can be perfectly accomplished. In addition to this, if at the time of surgery the findings are such that it be deemed advisable to perform a hemilateral laminectomy such a procedure may be performed through the same exposure.

A wide costotransversectomy approach can also be utilized to reach the posterior portion of the vertical body where ridging or sequestra may be present.

If the paraplegia is of a soft tissue type, but no gross abscess is demonstrable, clinically or by x-ray it may justifiably be assumed that the compression is the result of intraspinal granulations and should the surgical relief of such pressure become necessary laminectomy is indicated. Here again, remembering that spinal fusion may be necessary for the ultimate cure of the patient, complete neural arch resection is contraindicated because such a procedure irrevocably weakens the spine, removes considerable of the natural restraint of the spine to further collapse, and eliminates the possibility of adequate secondary surgical fusion.

Those cases of paraplegia resulting from direct bony pressure only, will necessarily require the enlargement of the bony canal and here a combination of laminectomy and fusion in one stage will probably prove most satisfactory, although costotransversectomy (to reach the posterior portion of the bodies) combined with the above may be necessary in the rare case.

SUMMARY

Tuberculosis of the spine must be considered as a local manifestation of a systemic disease and handled accordingly. Tuberculous abscesses are a complication that usually resolves spontaneously under general care. These abscesses should rarely be openly drained but if necessary to reduce pressure they should be aspirated.

Paraplegia is the most dangerous complication; it should be treated conservatively for a few months unless the spastic phase indicates an inclination to become flaccid at which time urgent surgical relief of pressure is indicated, and if surgical relief of pressure is indicated such technics should be used as will assure the maintenance of the integrity of the spine for subsequent fusion.

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REFERENCES

1. Girdlestone, G. R.: Tuberculosis of bone and joint. Oxford University Press, New York, 1940.

2. Albee, F. H.; Powers, E. J., and McDowell, H. C.: Surgery of the spinal column. F. A. Davis Co., Philadelphia, 1945.

ADDITIONAL REFERENCES

Auerback, O., and Stemmerman, M.: Roentgen interpretation of pathology in Pott's disease. Am. J. Roentgenol. 52:57-63, July 1944.

Mercer, W.: Orthopedic surgery. Ed. 2. William Wood & Co., Baltimore, 1937.

Shands, A. R., Jr., and Raney, R. B.: Handbook of orthopedic surgery. Ed. 2. C. V. Mosby Co., St. Louis, 1940.

Steindler, A.: Diseases and deformities of spine and thorax. C. V. Mosby Co., St. Louis, 1929.

Whitman, R.: Treatise on orthopaedic surgery. Ed. 9. Lea & Febiger, Philadelphia, 1930.

The Unitary Conception of Disease

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In the following report an endeavor is made to discuss, abstractly and briefly, diathesis, changes in the blood and the vegetative nervous system as they exist in disease and health; the necessity for correlation as opposed to the practice of differentiation, and a consideration that the whole is greater than the part. In such an attempt, details that would serve to integrate the reasoning are sacrificed for a more general statement of the concept.

Disease is defined by Stedman[1] as an interruption or perversion of function of any of the organs, a morbid change in any of the tissues, or an abnormal state of the body as a whole, but in practice the emphasis is placed not upon the body as a whole, but upon the organ or tissue expressing a state of dysfunction. In practice, treatment is directed not to the whole, but to the part. That is, therapy is symptomatic rather than directed toward the alleviation of the underlying factors responsible for the change in the whole, permitting a manifestation of disease in one or more of its parts. Emphasis today is placed on differential diagnosis, differentiating one manifestation from another, rather than correlating, seeking the common denominator of all divergence from health. Indeed, there may be but one disease and that, an altered chemicophysical state between the blood and tissues, inherited or acquired, resulting in perverted physiology—a constitutional imbalance permitting organic changes. Several present-day investigators ascribe to this doctrine and their research into this field is unique and monumental.

In France during the latter part of the eighteenth century and following only by a short interval the stagnation of medieval medicine, an interest was aroused in diathesis (a bodily type predisposing to a disease or group of diseases). This perhaps was the first attempt of any magnitude to inducive thinking associating disease of a part to the whole and concluding that the whole may be related to the changes in the part. This period was short-lived and soon forgotten with the work of Pasteur and the inception of the bacterial etiology of disease. This concept enjoyed wide acceptance and still reigns, but with tottering supremacy, as many conditions once thought to be the result of bacteria or the so-called foci of infection are being recognized as less that, and more a constitutional problem. None exemplifies this better than dental caries and arthritis.

Great strides are being made in the development of chemotherapeutics, particularly so in the field of antibiotics. With the use of the sulfa drugs, penicillin, streptomyocin, etc., infections are more easily controlled than previously. With the great amount of work being expended in this field it is within the realm of possibility that infections will soon disappear or be reduced to the minimum, leaving then that vast variety of chronic manifestations so crippling physically and emotionally.

With the improvement of technics of physical examination around the beginning of this century, differentiation came into its own. In recent years, interest has again turned to diathesis with many groupings and classifications of bodily types and none quite adequate to include all the variations of habitus found in everyday practice. Any scheme founded on morphology alone will prove insufficient to explain all the varied signs and symptoms of any given patient. However, diathesis is not without interest as it is a result first of inheritance and secondly environment, effects of chemicophysical change during gestation, and all those influences comprising environment of extra-uterine life.

The practice of differentiation, if continued, will serve only to conceal the true nature of disease. The subacute and chronic manifestations are on the increase and those to be afflicted are ever younger persons. The incidence of malignancy, nephropathy, and involvements of the heart and central nervous system have multiplied within a generation. These problems will be solved only when correlation replaces the practice of differentiation. Arthritis is defined as a disease of joints, an inflammation, a swelling, a destructive process involving the articular structure. Multiple sclerosis is defined as a disease of the nervous system. But these conditions are no more distinctive entities than migraine, angina pectoris, dysmenorrhea, or eczema. In each instance, the emphasis is placed on the organ or system involved. It is so in arthritis, that the presenting complaint is articular and the most distressing infirmities are the result of the destructive process taking place in cartilage, synovial membranes, and periarticular tissues. However, arthritis *is not* the disease, it is a manifestation, an expression of an altered body chemistry, something much more obscure, more abstruse than that which is obvious in the joint. Disease is a manifestation of a constitutional imbalance, a state of disequilibrium among the various physiological units of which the body is comprised.

Constitution may be defined as the structural, physiological, psychological resultant (different in each individual) of the properties of all the cellular and humoral elements of the body, and of the combination of these in a special cellular state having a balance and a functional output of its own, a given capacity for adaptation and a mode of reaction to its environmental stimuli (Pende[2]). There is within the constitution a number of physiological systems or units, each possessing a specific function and capacity and an interdependence on every other system; all affected by the acid-base balance of the blood and of the physical state of the blood proteins through the activity of the vegetative nervous system. It was perhaps intended in the beginning that the stability of the blood be such that integrity among the various systems would exist but this has not been the case. In any constitutional type, the imbalance predisposes to a group of associated clinical entities. The systems dominating the picture are hyperactive, perhaps from their genesis, dissipating their own stability before their time.

The role of the endocrines and the vegetative system are primary as the nature of any given constitution is dependent largely on the balance in these systems and the control they exert on metabolism, acidity, and alkalinity, and on the physical state of the dynamic protein particles of the blood, which in turn determines the water and mineral content of the body.

The effects among the acid-base balance of the blood, protein colloid particles of the blood plasma, and the vegetative nervous system are both direct and reciprocal. Relative acidosis subjects the protein colloids to dehydration and stimulates the sympathetics (sympathicotonia) with water mobilization. Relative alkalinity is concomitant with hydration of the protein colloids, water retention, and stimulation of the parasympathetics (vagotonia). Clear cut instances of vagotonia and sympathicotonia are seldom seen as the relative alkalinity or acidity may not be sufficiently constant, or more likely, the change to which the protein particles have been subjected is not uniformly the same, with some particles dehydrating while others are being made to hydrate, resulting in a vegetative instability with a mixed symptomotology. The altered dynamic protein particles in the blood precipitate in the tissues and organs and have a reversed effect on the static protein colloids in the cells of tissues and organs to which the dynamic particles were subjected in the first instance. The nature then of the pathological changes is dependent on the chemicophysical state suffered by the dynamic protein particles. Metabolism is influenced directly, anabolism by activity of the parasympathetics, and catabolism by the sympathetics. The parathyroid and pancreas exert a stimulating effect on the parasympathetic portions of the vegetative nervous system, whereas the thyroid and adrenal glands are sympatheticomimetic.

Intestinal malfunction, either an inherited anomaly or poor intestinal tone from vegetative instability and faulty diet with inadequate elimination, furnishes in the intestinal tract the environment for the growth of micro-organisms. These micro-organisms resident in the intestinal tract assist in altering the end products of digestion. The abnormal metabolites absorbed, subject the protein colloid particles in the blood plasma to abnormal chemicophysical changes. It is this altered blood that is responsible for the signs and symptoms of intestinal intoxication and the so-called infections from within. Faulty diet is almost universal with food grown on impoverished soil and the end products too highly refined. Constipation is perhaps the most prevalent characteristic of modern man and will remain so as long as such food and intestinal dysfunction persist.

The effects of the psyche on the vegetative nervous system are understood, but generally not appreciated. In emotional maladjustment, there is an alteration in tone of the vegetative system producing definite physiological response, which if allowed to persist will result in organic changes. Such major emotions as fear, anger, and pain express themselves through stimulation of the sympathetics. Psychoneurotic symptoms are not imagined. The pain and symptoms perceived by the patient, though psychogenic in origin, are very real, as much so as in a pathological process. Since all organic manifestations of disease are accompanied by more or less a degree of emotional instability, it often becomes a problem to determine which symptoms are organic and which are functional.

By the accurate measurements of Godin,[3] it has been demonstrated that in normal growth, phases of growth in width alternate with phases of growth in length. The former is represented by an increase in mass of the trunk (thorax and abdomen) and the latter by an increase in length of the extremities. This law of alterations between the development in breadth and length, likewise, exists in the individual segments of the body. If in utero this rhythm in development is disturbed by an environment of a faulty maternal chemistry, the constitutional imbalance is initiated in the first instance to exist morphologically thereafter. The anatomical short leg, understood so well by the osteopathic physician, with its accompanying pelvic tilt and spinal curvatures, is the resultant of an arrhythmic development. The question arises, "Is there a balanced constitution in which the chemicophysical state of the blood is normal and in which all the physiological units of which the body is comprised function in harmony?" A completely balanced or eumorphic constitution probably does not exist. Barring accidents the life span of such an individual would be considerably lengthened in comparison with that of the average. Natural physiological death has never been unquestionably observed in man. In those individuals dying at an extreme old age, autopsy would reveal organic changes in tissues and organs sufficient to bring about their demise. Centenarians have not been free from exposure, but their longevity is contributable to a more normally balanced organism.

With the foregoing concept familial disease is more easily understood, as each victim has inherited a similar blood chemistry and corresponding morphological inadequacies. In other conditions, not necessarily familial, it is the constitution superimposed by environmental factors (climate, faulty diet, and the stresses and strains of everyday living) which are responsible for the involvement. Disease then is a manifestation of an altered blood chemistry, inherited or acquired, effecting a constitutional imbalance and not solely a resultant of a morbid change in a single organ, system, or physiologically related systems. In diagnosis, examination of the blood is primary and correlation of findings must replace the practice of differentiation.

Treatment must be fundamentally designed to normalize the altered physical chemistry between the tissues and blood, blood and urine, to restore equality of activity among the various systems, and must include the removal of osteopathic lesions and instruction concerning proper diet, elimination, and habits. Inherited structural inadequacies can be altered but slightly; however, with care the abnormal physical chemistry and its effects can be reversed and relative health restored. When this is accomplished, destructive processes cease and signs and symptoms gradually lessen and disappear, as pathological changes can no longer exist.

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REFERENCES

1. Stedman's Practical medical dictionary, edited by N. B. Taylor. Ed. 16. Williams and Wilkins Co., Baltimore, 1946.

2. Pende, N.: Constitutional inadequacies, an introduction to the study of abnormal consitutions. Translated by S. Naccarati. Lea & Febiger, Philadelphia, 1928.

3. Godin: Cited by Pende, *Loc cit.*, ref. 2, p. 36.

ADDITIONAL REFERENCES

Bach, E., and Wheeler, C.: Chronic disease; a working hypothesis. Paul B. Hoeber, New York, 1925.

Bassler, A.: Intestinal toxemia ((autointoxication) biologically considered. F. A. Davis Co., Philadelphia, 1930.

Broderick, F.: The principles of dental medicine; the medical aspects of dental disease. Ed. 3. C. V. Mosby Co. St. Louis, 1939.

Földes, E.: A new approach to dietetic therapy. The Gorham Press, Boston, 1933.

Pottenger, F.: Symptoms of visceral disease. Ed. 5. C. V. Mosby Co., St. Louis, 1938.

Voronoff, S.: Life: A study of the means of restoring and prolonging life. Translated by E. B. Voronoff. E. P. Dutton and Co., New York, 1920.

THE JOURNAL OF THE
AMERICAN OSTEOPATHIC ASSOCIATION

Published monthly by the American Osteopathic Association

Publication Office, 100 S. Kenilworth Ave., Oak Park, Ill.
Editorial Office, 139 N. Clark St., Chicago 2, Ill.
Address all communications to the Chicago Office

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Subscription . . . . . Ten dollars a year in advance

Vol. 47 December, 1947 No. 4

BRITISH DOCTOR TEACHES MANIPULATION TO M.D.'S IN THIS COUNTRY

James B. Mennell, M.D., British exponent of manipulation, has been visiting this country and giving courses of instruction in the diagnosis and treatment of joint disturbances. At Columbia University Presbyterian Medical Center members of the class included neurologists, orthopedic surgeons, and specialists in "rehabilitation," as well as heads of departments of physical medicine from some of the leading hospitals in the East. According to the *Archives of Physical Medicine*[1] Mennell is scheduled to continue such instructions in one of the West Coast medical universities next year.

The works of Mennell are familiar to the osteopathic profession. His book, "Backache,"[2] was reviewed by the late Ray G. Hulburt over 15 years ago. "Physical Treatment by Movement, Manipulation, and Massage,"[3] was discussed by Hulburt in 1935. "Science and Art of Joint Manipulation,"[4] was reviewed by Strachan in 1939.

In 1945 the fifth edition of "Physical Treatment by Movement, Manipulation, and Massage"[5] was published. In this latest edition, the chapters on backache were practically rewritten and considerable material added. The following paragraph in which the education of osteopathic physicians is alluded to is quite a concession on the part of a man who, in the past, has damned with faint praise the osteopathic school:

> The first point to consider is: What is meant by sacro-iliac or lumbo-sacral "strain"? Among fully trained osteopaths, and also, I believe, most cheiropractors, it is held that the symptoms for which they apply treatment are due to impaired mobility of a joint. It is rare among them to hear reference made to the term "dislocation": "Subluxation" is a term sometimes applied. Perhaps the most common expression of all is "lesion," and it is interesting to note that, in osteopathy, a "lesion" is defined as "an immobilisation of a joint in a position of normal motion, usually at the extremity of a given movement." Thus no movement beyond anatomical limits is held to have taken place when this term is applied. There are, unfortunately, many people who claim to practise osteopathy who are so ignorant that they cannot define exactly which joints are supposed to be "displaced," failing to distinguish between the joints that separate the articular processes and the joints between the bodies of the vertebræ. These are the people who speak glibly about vertebræ being dislocated. There are, I believe, six schools recognized by the Osteopathic Association of America, in all of which the minimum duration of training is four years. Naturally the graduates of these colleges are far too well trained in anatomy, physiology and pathology for us to entertain any doubt about their knowledge of these all-important subjects. An immense amount of research has been done in these colleges, and we can be sure of this: No one trained in one of these schools, and who is worthy of the title "osteopath," will speak of dislocations of vertebræ as common "lesions." They acknowledge that actual displacements of the inter-vertebral joints, as the term would be commonly understood, are very rare, and attribute all the evils, for which their treatment is applied, to "subluxation" of the joints between the articular processes, the term "subluxation" having much the same meaning as "lesion."

Throughout the remainder of the section Mennell uses the term "lesion" and "joint lesion" freely. For instance, he says:

> With regard to "lesions" in other parts of the spinal column we encounter much the same story. Sometimes chronic, irritating cough (in the absence of physical signs in the chest) will yield spontaneously to manipulation, when due to reflex irritation of intercostal nerve trunks. Postural strain (kyphosis) may lead to local pain at any point and, at the same time, to referred pain along the course of any of the intercostal nerves. We must remember that these supply the wall of the chest and abdomen, and above the third thoracic vertebra we approach the area in which the main nerve trunks of the brachial plexus arise.
>
> In the cervical region manipulation often succeeds in curing many forms of chronic headache, and particularly in the occipital region; and many patients have been relieved of what almost amounted to migraine attacks. Great also is the assistance rendered in many cases of brachial neuritis and of a similar condition in the branches of the superficial cervical plexus.

It is reliably reported that Mennell recognizes the fact that visceral disturbances may cause pain in spinal areas and that a deranged spinal joint may cause symptoms in a different spinal area, but he emphatically insists that spinal joint derangement cannot cause visceral disturbances. This is rather inconsistent with his discussion of asthma in the fifth edition of "Physical Treatment by Movement, Manipulation, and Massage," wherein he says:

> It is a very common thing for patients to lock the costo-vertebral and costo-transverse joints in a position of expiration, and this acts as a definite irritant, which pulls the trigger, as it were, to cause the onset of the [asthma] attacks. Every attempt, therefore, should be made to restore the mobility of these joints by manipulation.

Mennell's visit to the United States has aroused considerable interest among M.D.'s. The editorial writer in the *Archives of Physical Medicine*[1] says that Mennell is doing a great service to the specialty of physical medicine "by conveying the information, which he has carefully and laboriously developed during many years to others, some of whom may carry on in the conduct of research which this field so sorely

1. Editorial: Manipulative therapy. Arch. Phys. Med. 28:725-726, Nov. 1947.
2. Mennell, J. B.: Backache. J. & A. Churchill, Ltd., London, 1931. Reviewed by Hulburt, Ray G.: Backache and body mechanics. J. Am. Osteop. A. 30:421, June 1931.
3. Mennell, J. B.: Physical treatment by movement, manipulation, and massage. Ed. 3. The Blakiston Co., Philadelphia, 1934. Reviewed by Hulburt, Ray G.: Another investigation of osteopathy. J. Am. Osteop. A. 34:285, Feb. 1935.
4. Mennell, J. B.: The science and art of joint manipulation. P. Blakiston's Son and Co., Philadelphia, 1939. Reviewed by W. F. Strachan in J. Am. Osteop. A. 38:410-411, April 1939.
5. Mennell, J. B.: Physical treatment by movement, manipulation, and massage. Ed. 5. The Blakiston Co., Philadelphia, 1945.

needs. While he is still with us, we should take advantage of his special skills and experiences to develop further the science and the art of joint manipulation by the studying of the living anatomy of joints and by such other means as he may suggest."

The reason for the apparent acceptance of Mennell and his teachings is clearly set forth earlier in the editorial, but, as anticipated, the writer cannot refrain from casting derogatory remarks concerning doctors practicing manipulative therapy who do not possess the M.D. degree:

> Many patients complaining of . . . pain and limitation of movement [in joints] secure relief from manipulations applied by physicians and by others who do not possess the degree of doctor of medicine. The number of physicians who employ manipulative therapy is comparatively small, so that many a patient has recourse to the irregular "manipulator" in the effort to secure relief. Whatever the explanation, be it a psychic or massage effect, or due to a definite change in the relationship of opposed bony surfaces, the fact is that relief is frequently secured. Such observations are in the main subjective and empiric and therefore suffer from the lack of substantiation which may be obtained by a controlled series of cases or by one to which objective criteria can be applied. However, the commonness of these experiences and the long number of years which they have occurred, certainly create a challenge for the further investigation of this field by the regular members of the medical profession. The Baruch Committee wisely recognized this investigative need when on granting a large sum of money to one of our medical schools, it suggested that research be carried out in manipulative therapy.

Results of such research on manipulation have not yet been published to our knowledge and many months or years may pass before the findings of research projects which may have been set up in medical schools are available.

Much of the groundwork necessary for the conduct of this type of research has already been laid in osteopathic schools. The investigations being carried out by J. S. Denslow and associates at the Still Memorial Research Laboratories, Kirksville, Mo., are one example. Their findings have been published in various issues of *The Journal of Neurophysiology* and the *American Journal of Physiology* for scientists interested in this type of work to study. An excellent article on "The Neural Basis of the Osteopathic Lesion" occupies the lead position in this issue of THE JOURNAL OF THE AMERICAN OSTEOPATHIC ASSOCIATION. However, it is probably too much to expect that the hierarchy controlling the allotment of Baruch funds will find it expedient to consult experienced osteopathic research workers in the interest of saving money or in the avoidance of a duplication of basic research in this field.

STUDY OF REFLEX THRESHOLDS IMPORTANT TO OSTEOPATHIC CONCEPTS

For purposes of communication in research it has been found necessary, in many instances, to reduce the outcome of investigations to the visual level. There is a tendency to regard reports of occurrences that cannot be so reduced as unscientific. This trend has been so marked that great effort has been expended in devising means of directly recording instances observed in order to limit as far as possible any personal element. There is good justification for this. Sound recordings are cumbersome to transport and may be distorted in reproduction. Odors do not readily lend themselves to calibration. Touch or palpation is largely dependent on interpretation by the operator, and there is a paucity of descriptive terminology. The use of the special sense of taste is subject to the same objection as the use of smell. The problem up to the present has been how to portray dynamic processes through an inert media or to reduce spatial and temporal phenomena to a spatial form of self-recording. One method has been the serial display of photographs or photomicrographs. Another has been the use of mechanical or electrical graphs. In the laboratories of the Still Memorial Research Trust, the latter has been the means of transmitting significant findings.

In 1941 Denslow and Clough,[1] by use of the electromyograph, determined reflex muscle activity to exist in "lesion" areas, i.e., areas resistant to pressure deformation of the periarticular tissues, and predicated an enduring subliminal central excitatory state in motoneuron pools on the basis of Fulton's work.[2] In 1942 Denslow and Hassett[3] studied the central excitatory state in postural abnormalities, i.e., "lesion" areas, and stated that where spontaneous electromyograph activity is absent it can be induced by suitable stimuli.

The wave form or the electromyographic pattern is discussed by Denslow and Hassett[4] in "The Polyphasic Action Currents of the Motor Unit Complex," a critical attempt by them to analyze their own method.

Having shown by the earlier studies that a reflex muscle activity existed or, if latent, could be induced easily in "lesion" areas, Denslow[5] undertook "An Analysis of the Variability of Spinal Reflex Thresholds" for which purpose he devised a pressure meter designed to apply moving pressure from one to seven kilograms for a stated interval (0.26—2.0 seconds) to the spinous processes. Pain thresholds were distinct from activity thresholds if the latter were high, but tended to coalesce as the pressure needed to induce activity in the motor unit diminished (low threshold or "lesion" areas). It was found that wide threshold differences were present in different subjects and, while varying from segment to segment and side to side in a given subject, were constant for that subject.

These variabilities in reflex thresholds were investigated further by Denslow, Korr and Krems[6] in "Quantitative Studies of Chronic Facilitation in Human Motoneuron Pools," and it was learned that pressure applied at spinous processes of a high threshold which induced no activity in that segment and might bypass other high threshold segments would elicit activity in a low threshold segment remote from the point of irritation. It was further learned that spread to low threshold areas was more common than spread from such areas and that it occurred more frequently in a cephalad than in a caudad direction.

1. Denslow, J. S., and Clough, G. H.: Reflex activity in the spinal extensors. J. Neurophysiol. 4:430-437, Sept. 1941.
2. Fulton, J. F.: Physiology of the nervous system. Ed. 2. Oxford University Press, New York, 1943.
3. Denslow, J. S., and Hassett, C.: The central excitatory state associated with postural abnormalities. J. Neurophysiol. 5:393-402, Sept. 1942.
4. Denslow, J. S., and Hassett, C.: The polyphasic action of the motor unit complex. Am. J. Physiol. 139:652-660, Aug. 1943.
5. Denslow, J. S.: Analysis of variability of spinal reflex threshold. J. Neurophysiol. 7:207-215, July 1944.
6. Denslow, J. S.; Korr, I. M., and Krems, A. D.: Quantitative studies of chronic facilitation in human motoneuron pools. Am. J. Physiol. 105:229-238, Aug. 1947.

A significant inference can be drawn from these reports. If the electrical measure of activity in the motor unit is a criterion, afferent impulses are reaching it both intrinsically maintaining the central excitatory state and extrinsically facilitating motor unit activity without inducing pain, i.e. the activity threshold is below or different from the pain threshold, but when the former is lowered there is a tendency toward parity. This activity is considered akin to proprioceptive and stretch reflex activity.

It can be inferred or presumed that a greater irritation or excitation is needed for the afferent impulse to transgress the paths to the sensorium than is needed to traverse the pathway to effector elements and result in reflex activity, and that a similar situation exists in respect to trophic, vasomotor, and other effector elements as has been shown to be present in the motoneuron pool. L. V. Strong, Jr., D.O.

GIFTS THAT LIVE AFTER YOU

When thou makest presents, let them be of such things as will last long: to the end they may be in some sort immortal.—Thomas Fuller (1608-1661).

Thirty years ago this month Andrew Taylor Still passed away. He left the world an immortal gift, osteopathy. He left to his students the sacred trust of carrying on the system of health and healing which he founded for the benefit of mankind.

Dr. Still's long and eventful life is an inspiration to many thousands of osteopathic physicians. It will continue to be a guiding star for thousands yet unborn —if the osteopathic colleges continue to exist. Their existence depends upon the osteopathic profession.

To maintain the colleges in the manner which modern times and conditions demand, requires above all else—wealth. The lack of wealth in an educational institution is a serious problem. It can be solved, however, if every osteopathic physician will assume personal responsibility.

At this season of the year when everyone is gift-conscious, let us remember to make a contribution to the support of osteopathic education. But let us not stop there. Let us make known the needs of our colleges to our patients and friends. President Robert B. Thomas in a recent speech before the House of Delegates of the Michigan Association said: "Philanthropists are interested in knowing how well you are sold on the profession. If you can show them that you have contributed to osteopathic institutions, you have gone a long way toward convincing them that they should contribute."

Money given to educational institutions perpetuates the usefulness of the donor through all time. His gift confers upon him an immortality of usefulness. Through it he becomes a permanent prop of civilization, an ever-living force in human progress.

SPECIAL ARTICLE

Outstanding Vocational Guidance Programs

LAWRENCE W. MILLS, A.B., M.S.
Vocational Director, A.O.A.
Chicago

MICHIGAN

On Wednesday, November 5, a vocational guidance luncheon was held in the Pantlind Hotel, Grand Rapids, presided over by Dr. E. H. McKenna, Chairman of the Department of Professional Development of the Michigan Association of Osteopathic Physicians and Surgeons. A large number of high school counselors and principals, several superintendents of schools, premedical advisers from colleges and one university, and counselors from various veterans' bureaus attended. The speaker of the day was Warren K. Layton, Ph.D., President of the National Vocational Guidance Association and Vocational Guidance Director of the Detroit Public School System. All of the members of the vocational guidance committee of the Michigan Association of Osteopathic Physicians and Surgeons were present.

Dr. McKenna spoke briefly on the great need of physicians and the importance of an efficient student selection program, in view of the limited capacity of the medical schools. Edwin F. Peters, Ph.D., President of the Des Moines Still College of Osteopathy and Surgery, briefly reviewed the admissions program of osteopathic colleges. Dr. Layton presented a very interesting address in which he outlined the history of the development of vocational guidance and then emphasized how the professional man could assist the trained counselor in giving information about his profession to the student and in assisting in the selection of students for his profession. Dr. Layton complimented the osteopathic profession for the interest and activity which members of the profession all over the country are showing in vocational guidance.

This is not the first time that Dr. Layton has cooperated with the osteopathic profession. For a year before he was elected president of the National Vocational Guidance Association, Dr. Layton rendered extremely valuable service to the osteopathic vocational guidance committee in Wayne County, Michigan. Dr. Russell M. Wright, vocational guidance chairman of Wayne County, has had several important conferences with Dr. Layton and has met the counselors in the Detroit public schools. The luncheon which was attended by over 200 educators and physicians was one of the high points of the Michigan Association convention. Dr. McKenna and his hard working committee have frequently been mentioned in osteopathic publications for their splendid vocational guidance program, which has been functioning so well for the past 1½ years. Thirty-nine carefully selected students from colleges in Michigan entered osteopathic colleges in September 1947. This represents a jump of eleven students over last year. During the past 2 years nearly seventy highly selected students have matriculated in osteopathic colleges from the State of Michigan.

WASHINGTON

Dr. Eugene E. LaCroix, vocational guidance chairman of the Washington Osteopathic Association since June 1947, has inaugurated an energetic educational program for the osteopathic profession in Washington.

The following physicians are carrying on under Dr. LaCroix's guidance: Ellsworth A. Archer, H. E. Caster, Harry L. Davis, William D. Holt, Duane E. Johnson, Richard S. Koch, George P. Lewis, Ralph G. Sharninghouse, and Clarence B. Utterback.

Mr. Harold Hines, Director of Counseling of the University of Washington in Seattle, has met with the Seattle Osteopathic District and is assisting Dr. LaCroix in his program. Vocational literature describing the profession has been distributed to all high schools and colleges in the state. The physicians listed have volunteered their services to the college premedical advisers to assist in counseling those students expressing a desire for the osteopathic school of medicine. Dr. Richard Koch of Olympia has had several conferences with the Director of Occupational Information of the State Department of Education of Washington. Vocational literature was sent out by the Department of Education.

OREGON

Dr. John S. Gilhousen, vocational guidance chairman of the Oregon Osteopathic Association for the past 2 years, is carrying on an active program of educating the educators in that state about his profession. Dr. Gilhousen spent nearly a week with the Vocational Director of the A.O.A. in visiting colleges and universities there. The Director of Vocational Information of the State Department of Education has cooperated with Dr. Gilhousen for 2 years in sending literature about the osteopathic profession to every high school in the state. Interest in the educational program is high among the osteopathic physicians in Oregon. Dr. C. H. Beaumont of Portland, an A.O.A. trustee, who occupies a high position in the American Legion, has found time to represent his profession in the several colleges and universities in Portland. Dr. Beaumont spent considerable time with the Vocational Director in visiting the four colleges and universities in his city and offering his services to counsel any college student who expresses an interest in the osteopathic profession.

IOWA

Dr. Richard C. Rogers, vocational guidance chairman of the Iowa Society of Osteopathic Physicians and Surgeons, with the assistance of Mr. Dwight James, Secretary of the Iowa Society, Mr. Frank Miles, Public Relations Counselor of the Iowa Society, and John B. Shumaker, Ph.D., Dean of the Des Moines Still College of Osteopathy and Surgery, have worked out perhaps one of the best organizations of any divisional society. The following district vocational guidance chairmen are at work: Drs. D. L. Widmer, H. D. Meyer, H. H. Jennings, C. R. Barry, H. L. Nelson, W. J. Morrison, R. C. Rogers, B. A. Wayland, B. B. Bahme, J. W. Campbell, G. W. Sutton, G. W. Loerke, C. R. Ayers, R. B. Anderson, J. F. LeRouge, and J. G. Garton.

College representatives have been named in the osteopathic profession in each one of the college towns. A Speakers' Bureau has been formed, made up of the following physicians: J. K. Johnson, Jr., J. R. Forbes, R. C. Rogers, L. P. Fagen, H. L. Nelson, L. A. Nowlin, B. B. Bahme, and G. W. Sutton.

Each one of these men is ready to represent his profession before educational groups. Literature is being distributed to the high schools, colleges, and libraries in the state.

SOUTH DAKOTA

Dr. Laurence S. Betts, vocational guidance chairman of the South Dakota Society of Osteopathic Physicians and Surgeons, with the assistance of Dr. E. W. Hewlett, Secretary of the South Dakota Society, has initiated a strong educational program in his state.

OTHER STATES

The Kansas and Missouri osteopathic societies have recently inaugurated educational programs under the leadership of Dr. Roy L. Brown and Dr. Lloyd E. Hutchins, respectively. "Osteopathy as a Career," published by the New York State Osteopathic Society, under the direction of Dr. H. C. West, has recently been revised and is available for all divisional societies. Purchase orders may be sent directly to Dr. H. C. West, 64 Ludlow Street, Yonkers, N. Y. Dr. L. V. Cradit of Amarillo, Tex., has recently been appointed vocational guidance chairman of the Texas Association of Osteopathic Physicians and Surgeons. He has initiated a strong program in guidance, which this year will be culminated in an extended college visitation trip immediately prior to the annual convention in April. Dr. Cradit will be accompanied by the Vocational Director. Dr. Mary Lou Logan of Dallas, Tex., former vocational guidance chairman of the Texas Association, has become vocational guidance chairman of the Osteopathic Women's National Association.

Educational programs being carried on by other divisional societies will be called to your attention in future issues of THE JOURNAL.

139 N. Clark Street

Department of Public Affairs

BENJAMIN F. ADAMS, D.O.
Chairman
West Hartford, Conn.

BUREAU OF LEGISLATION

H. DALE PEARSON, D.O.
Chairman
Erie, Pa.

The right or privilege of practicing osteopathy is basically a grant of authority from the government. This grant of authority usually stems from an act of the legislature and very often is subject to varying interpretations by courts and administrative authorities. Recognizing the importance to osteopathic physicians of information concerning the legal aspects of the healing arts, the Bureau of Legislation has undertaken in this column to report news of pertinent legislative activity, court decisions and administrative rulings which come to its attention.

Since many of the rulings of administrative authorities are informal in nature and may not be brought to the attention of the General Counsel or the Bureau of Legislation in the natural course of events, it is hoped that the readers of the JOURNAL will keep the Bureau of Legislation, through the General Counsel, informed of legal matters which should be reported to all osteopathic physicians.

The reports appearing in this column are to be regarded merely as announcements of the existence of legal or administrative action in which the profession is interested. If a detailed analysis of any material discussed is required, it will be supplied upon request by the General Counsel's office in accordance with the following policy of the American Osteopathic Association, adopted by the House of Delegates in 1934:

The American Osteopathic Association, its Central office, its departments, bureaus, and committees, shall provide information touching legislation and legal decisions to members of the Association, only with the consent of the proper authority of the divisional society in the territory in which the inquirer practices.

ABSTRACTS OF JUDICIAL OPINIONS

Prepared by Edmund Slack
Assistant General Counsel, A.O.A.

Application of Doctrine of Res Ipsa Loquitur in Cases of Injury During Medical Treatment.—The doctrine of res ispa loquitur is defined in 45 CJ 1193 as follows:

> Where the thing which caused the injury complained of is shown to be under the management of the defendant or his servants and the accident is such as in the ordinary cause of things does not happen if those who have its management or control use proper care, it affords reasonable evidence, in the absence of explanation by defendant, that the accident arose from want of care.

This is a rule of evidence which plaintiffs' counsel so often strive to have courts invoke on behalf of their clients in cases involving the question of negligence. Because of the many attempts to have the doctrine applied to different sets of facts, courts have taken several views as to the application of the doctrine.

A case often cited in relation to this doctrine is *Ybarra v. Spangard,* 154 P. 2nd 687 (1944), where plaintiff, whose ailment was diagnosed as appendicitis, entered the hospital, was given a hypodermic, slept, and when awakened was wheeled to the operating room. The anesthetist placed him on the operating table so that "two hard objects" pressed against his shoulders. When awakened, he felt a sharp pain in his right shoulder. Upon consulting a doctor, he learned that the "injury" was a paralysis of traumatic origin not arising from pathological causes, and not systemic.

Ybarra brought suit for injuries resulting from alleged improper treatment, joining all persons who attended him at the hospital. The court granted a nonsuit, and Ybarra appealed. The Supreme Court of California reversed the judgment, holding that Ybarra presented a proper case for the application of the doctrine of res ipsa loquitur, and that the inference of negligence arising therefrom made the granting of the nonsuit improper.

They held that it is not necessary to identify the instrumentality or particular defendants causing the injury, for to do so would unreasonably limit the application of the rule. In the language of the court:

> It should be enough that the plaintiff can show an injury resulting from an external force applied while he lay unconscious in the hospital; this is as clear a case of identification of the instrumentality as the plantiff may ever be able to make. (*Supra,* p. 690)
>
> * * *
>
> We merely hold that where a plaintiff receives unusual injuries while unconscious and in the course of medical treatment, all those defendants who had any control over his body or the instrumentality which might have caused the injuries may properly be called upon to meet the inference of negligence by giving an explanation of their conduct. (*Supra,* p. 691)

The three conditions which must exist before the court will apply the doctrine are well stated in *Ybarra v. Spangard, (Supra,* p. 689) as follows:

> 1. The accident must be of a kind which ordinarily does not occur in the absence of someone's negligence;
> 2. It must be caused by an agency or instrumentality within the exclusive control of the defendant;
> 3. It must not have been due to any voluntary action or contribution on the part of the plaintiff.

But let us see whether this decision is consistent with some recent cases involving similar facts in other jurisdictions. Remember that in the Ybarra case, the case did not get to the jury. In *Dierman v. Providence Hospital et al.,* 179 P. 2nd 603 (1947), the District Court of Appeal, First District in California, affirmed a judgment for defendants, hospital, surgeon, and anesthetist, where the patient who was on the operating table for the dual purpose of removal of a wart from her nose and a tonsillectomy, suffered an injury to her eye as a result of an explosion 6 inches above her face while the surgeon was cauterizing the nose wound with a hot electric needle. The plaintiff was denied a directed verdict. The jury having listened to all defendants, rendered a verdict in their favor, and judgment was entered accordingly.

The court would not disturb the judgment, having this to say at page 607:

> The doctrine creates an inference of negligence which is alone sufficient to get a plaintiff past the danger of nonsuit, and to permit him to get his case to the trier of the fact. Under this view the burden of proof still lies with the plaintiff and defendant may or may not choose to resist the inference by rebutting evidence. Even if defendant offers no rebutting evidence, it is still for the jury to determine whether the plaintiff—having as he does the inference of negligence in his favor—has made out his case by a preponderance of evidence. It is for the jury to determine whether it will indulge in the inference.

We see then, that it was not necessary in this case for the defendants to explain the cause of the accident. The burden of proof did not shift to the defendant in the California case where the doctrine was applied, but the inference of negligence drawn from the circumstances was sufficient to take the case to the jury.

In support of its decision the court stated:

> The jury having impliedly found that the injury was not traceable to the lack of due care on the part of the defendant, and that finding being based on the evidence that they exercised due care this court has no power to disturb the findings. (*Supra,* p. 610)

The Dierman case very accurately expresses the three different views which have developed in the courts as to the nature of the benefit accruing to the plaintiff and the nature of the burden thrown upon the defendant when the doctrine is applied. The first view, that applied in the Dierman case, is applied by a majority of American courts. The other two views are quoted as follows:

> The second view is that the application of the doctrine creates a presumption of negligence against the defendant, and thus casts upon him the burden of "going forward" with evidence to rebut the presumption that he has failed to exercise due care. If defendant fails to offer rebutting evidence it is probably the law that a verdict should be directed for plaintiff based upon the presumption. The third view concerns the procedural effect of the doctrine in that when plaintiff makes out his res ipsa case, there is then a shifting of the burden of proof to the defendant—and it becomes his duty to negate the implication of negligence by a preponderance of evidence. (*Supra,* p. 607).

In Nevada, the Supreme Court affirmed a judgment for a plaintiff in the matter of *Las Vegas Hospital Association, Inc. et al. v. Gaffney,* 108 P. 2nd 594, (1947), where the hospital and attending physician were sued. Plaintiff (an obstetrical patient) was returned from the operating room to her bed, into which hot water bottles had previously been placed. The patient alleged that either a hot water bottle or "some other instrumentality" caused a severe burn on her leg which resulted in a permanent scar. It was held that the lower court properly applied the doctrine of res ipsa loquitur; the court saying:

> Where the circumstances of the occurrence that has caused the injury are of a character to give ground for a reasonable inference that if due care had been employed by the party charged with care in the premises, the thing that happened amiss would not have happened, negligence may fairly be inferred in the absence of any explanation. (*Supra,* p. 598)

The court stressed in its opinion, that it was not necessary for the plaintiff to submit proof of any act of negligence, for the proof of the accident carries with it a presumption of negligence which defendant must successfully rebut. In the instant case the jury determined that defendants did not overcome the presumption of negligence.

Indicative of the limitations on the application of the doctrine, is the decision in *Wallstedt v. Swedish Hospital et al.,* 19 N. W. 2nd 426 (1945), handed down by the Minnesota Supreme Court. In this case also the plaintiff suing the hospital and surgeon, claimed that the burn on her leg could have been caused by a hot water bottle placed in the bed under circumstances similar to those in the Las Vegas Hospital case above. There was testimony by doctors that the burn could have been from several causes, not all of which were under the defendants' control. The court ruled that the doctrine of res ipsa loquitur was not applicable as the instrumentality causing the injury had not been within the exclusive control of the defendants. The court supported its decision, and distinguished the case before it from the Ybarra case mentioned above with the following language:

> In the Ybarra case, there seems to be no question that plaintiff's condition was of traumatic origin. He received unusual injuries while unconscious. Not so in the instant case, where medical testimony was to the effect that plaintiff's lesion could have been the result of one of several causes.

Department of Public Relations

CHESTER D. SWOPE, D.O.
Chairman
Washington, D. C.

SCIENCE AND PUBLIC POLICY*

MANPOWER FOR RESEARCH

"Manpower for Research," Vol. IV of the Report of the President's Scientific Research Board entitled "Science and Public Policy," stresses the serious shortages of supply of highly trained scientists and technicians. According to the report, for the next 2 years there will be too few scientists to permit the substantial expansion of research and development programs that the nation requires, and for the long run there is danger of a shortage of high-quality scientists.

Although there are some 600,000 students now enrolled in scientific and engineering courses in our colleges and universities, there is serious doubt that that number can be adequately trained unless broad action is promptly taken to assure that the students have what they need of facilities and scientist-teachers. A graduate of science is not necessarily a scientist. Numbers without quality will not make up the shortage, nor assure the nation's scientific progress.

The colleges and universities would require 15,000 more science instructors, including 4,500 with doctor's degrees, if the prewar student-teacher ratio were to be reestablished.

The scientific progress of the nation depends upon about one-half of one per cent of its population—some 750,000 persons. Included are those with college degrees in the physical, biological, and agricultural sciences and in engineering, plus a few who have acquired equal competence without college degrees.

Teachers' salaries, generally, have increased only 20 to 30 per cent since 1940, while living costs have risen nearly 60 per cent. This is the chief reason why so many scientists have not gone back to teaching. It also attracts new graduates away from teaching careers. Two-thirds of all science instructors in higher education received salaries of less than $4,000 a year in 1946.

Provision of financial assistance to colleges and universities is indispensable if we are to assure our scientific future. Deliberate efforts must be made to strengthen all the institutions which make up our system of higher education for science. It will not be enough to build up a few institutions as research centers or as centers of advanced training.

As a nation, we need to do the following things:

1. Develop sources of financial support for our colleges and universities to enable them to expand and improve their facilities and equipment, to increase their instructional staff, and to raise salaries. This cannot be done for the physical and biological sciences alone, but only as a part of a general program. The specific ways of accomplishing these objectives are now under study by the President's Commission on Higher Education. But ways must be found.

2. Develop a broad program for the support of basic research in the universities and colleges. Basic research not only is of supreme importance to the whole development of science, but it is indispensable to the training of scientists. As already outlined in the first report in this series—"Science and Public Policy—A Program for the Nation"—support of basic research should be extended by establishment of a National Science Foundation responsible to the President and a share of the money expended should be used to build up and strengthen the weaker but promising educational institutions.

3. Develop a national system of scholarships and fellowships to continue Federal support of students as the benefits under the Servicemen's Readjustment Act expire. Such a program should cover all fields of knowledge and not be restricted to the physical and biological sciences. This matter has also been touched upon in the report, "Science and Public Policy—A Program for the Nation," and is also under study by the President's Commission on Higher Education.

If we do these things promptly—and only if we do these things—can our scientific future be assured.

THE NATION'S MEDICAL RESEARCH

In announcing the receipt of Vol. V entitled "The Nation's Medical Research," the President observed that although increased research expenditures and the training of scientists are necessary, they will not improve the health of the people unless the results are made available to them. Said the President:

"I have previously emphasized that our national welfare demands a health program which will bring medical care within the reach of all of our people. Only a national health insurance system will meet that need. Such a system together with an expanded and well balanced research program, and an increased supply of medical scientists and doctors will strengthen our nation and reduce unnecessary human suffering."

Vol. V contains recommendations for coordinating the Federal Medical Research Program for greater efficiency, and other recommendations for more effective use of the nation's scientific resources in this field.

Considering the barriers to medical research, the report states:

The Nation as a whole invests only around $110 million annually for scientific research and the development in medical and allied fields as contrasted with more than 10 times that amount spent for all other forms of scientific inquiry.

Prewar Progress.—Medical research has been a function of the Federal Government for more than half a century; but not until the war brought fresh and substantial sums of money to bear upon the Nation's total scientific effort in this field, did the Government occupy a prominent position as an entrepreneur of medical science. In the Public Health Service, formal research began in 1887. Although activities increased progressively thereafter, rapid expansion did not begin until 1935 when provisions of the Social Security Act more than doubled authorized expenditures for disease and sanitation investigations. Prior to the war, neither the Army nor the Navy formally recognized research as a distinct function of their medical departments. Research in the Food and Drug Administration grew slowly after that agency was created in 1905. The Veterans' Administration conducted no research in its between-war medical program.

Impact of War.—The war had a revolutionary effect upon medical research as a whole. Medicine and medical research received a tremendous impetus, under which scientists produced phenomenal discoveries and advances. Scientists in colleges, universities, and hospitals accepted a controlled, directed medical research program, and they vigorously cooperated with the Government in it, under a special agency created to coordinate scientific effort. The Federal Government became the leading supporter of medical research.

But, at the same time, fundamental research practically ceased in favor of applied research and development; investigation was concentrated exclusively upon diseases and conditions of military importance.

Lack of Funds.—The serious shortage of investigators in nearly all categories and disciplines constitutes a major barrier to progress in medical science. Moreover, lack of operating funds soon may force some medical training centers to curtail both training and research at a time when expansion of both is vitally needed. An even more acute financial need exists in the graduate schools for basic sciences. Thus, the training grounds for medical investigators—the very roots of medical research—are threatened.

The medical schools and the basic science departments of universities have been at once the producers of new knowledge and the training grounds for investigators. Before the war, 90 per cent of medical research was conducted in universities and hospitals; and the bulk of investigations is still in the Nation's medical centers. Both laboratory and clinical research have been almost exclusively the province of professors. At first, research was carried on independently and solely as an expression of the teacher's intellectual curiosity and creative thinking. But early in the twentieth century, the medical schools recognized that research was an essential part of the training program; since that time, increasing proportions of medical faculties have been engaged in research and larger amounts of the individual teacher's time have been absorbed in investigations.

Thus, if research suffers, the standard of training physicians for clinical practice will be lowered. Reduction in quality is inevitable unless operating funds, as well as research money, can be provided.

OVERCOMING THE BARRIERS:

Two major steps are needed promptly to assist in overcoming these barriers to realizing recent gains in medical science and to further progress. They are:

Provision of substantial additional funds for training and research at the earliest feasible moment.

Formulation of a national policy on medical research.

Increased Funds.—Concerning funds for medical research, it is necessary to specify what can be expected from increased expenditures. The dramatic implications of wartime medical advances and the apparent speed with which they were made have become associated in public thinking with large increases in the financial investment in medical research. There is a widespread expectation that if enough money is made available, medical research laboratories will produce startling discoveries almost overnight. This misconception was termed by President Fosdick of the Rockefeller Foundation "the magic-wand theory of medical advance."

Such abundant hopes are foredoomed. The success of medical investigators in solving difficult problems during the war was based upon the scientific groundwork laid years ago by the unhurried, untrumpeted investigations of thoroughly trained research scientists.

*Continued from p. 171, November JOURNAL.

The hope of the future in medical research lies in preserving a balance between the search for new fundamental knowledge and application and development of new technics, and in training an adequate supply of skilled investigators.

It is toward these ends that funds should be directed. Increased funds can provide the means that enables more research investigators to be trained and to devote their time to seeking benefits for national health, and it can provide them with subsistence, with facilities and equipment, and with the organization they need for maximum efficiency. Thus, with the stipulation made, it is logical to assume that increased expenditures will markedly accelerate medical progress.

Therefore, this report recommends that, as part of the expanded program for all science, expenditures for medical and allied research should be at least tripled by 1957—to a total of not less than $300 million a year.

A National Policy.—There is an immediate need for the formulation of a national policy on medical research through participation of both public and private organizations. Such a program could identify the current and long-term needs in order of importance and suggest the fields in which the public and private organizations can make their maximum contribution to medical progress.

This does not mean that research in medical and allied sciences can be, or should be, divided into sections like a pie and then distributed for exclusive exploitation to individual agencies and groups. On the contrary, the formulation of such a policy calls for group thinking; the representatives of universities, foundations, business and industry, voluntary associations, and Government should meet periodically to review and evaluate needs and resources.

In the formulation and implementation of national policy, the role of the Federal Government should be that of leader and supporter of national effort, preserving the fullest freedom of other interested groups to continue and expand their contributions to medical research.

Within the Federal establishment, the Government agencies should continue to carry on research in their authorized programs. From time to time, however, a careful review should be made of existing Government programs in order that emphasis may be shifted to reflect changing needs and interests of the people in diseases receiving inadequate attention by other research groups.

The considerable weight of Federal resources should be placed upon existing deficiencies, and for this purpose the Government's program should be kept flexible. Today, the outstanding need of medical research is for trained investigators; a few years hence, it may be for costly equipment to implement brand new approaches to the problems of disease. The danger of rigidity is common to all scientific endeavor; special efforts should be made to keep the Government's policy and program flexible, sensitive to shifting needs and existing gaps in medical research.

At present there is no Government-wide organization to suggest national policy nor to coordinate Federal medical research programs. Only a joint attack by public and private agencies will assure the most efficient use of our resources for medical research and development. The findings and recommendations of this report point to the need for prompt action in this respect.

A committee composed of Government and non-Government medical scientists should be established promptly. At least at the outset, this committee should work within the framework of the Inter-departmental Committee recommended in volume one of this report. The Medical Research Committee should examine the national medical research program and, in broad scope, suggest a comprehensive program to utilize most effectively all of the Nation's resources for medical research.

SOURCES OF FUNDS:

Until the war, the chief support of medical research came from the donations of private citizens and organizations, and these continue an important source of funds. In the Thirties, voluntary health associations entered the field, and during the past decade, Federal Government and industry increased their investments so impressively that they are now the principal supporters of research in medical and allied sciences.

Private support from all sources including industry still greatly exceeds public support, but Federal appropriations alone now are greater than the combined annual expenditure of foundations and voluntary health associations.

Best estimates indicate that the total of $110 million or more from all sources expended for medical research in 1947 was divided like this:

	Percent
Industry	45
Federal, State, and local governments	28
Foundations	13
Voluntary associations	9
All other sources	5

The Federal Government's $28 million budget for research and development in medical and allied sciences during 1947 provided increases over prewar levels for all medical research programs of Federal agencies. However, much of the increase went for continuation of the war-born programs of the Army and the Navy.

Until 1937, virtually all Federal medical research was conducted by Federal agencies in their own laboratories. At the present time, slightly more than half of the Government's medical research funds are spent in this way. The remainder is devoted to grants, contracts, and fellowships.

Although precisely accurate figures are not available, it is clear that the Government's support of fundamental and background in medical and allied sciences exceeds that of the philanthropic foundations, which is estimated at between $8 million and $10 million. Approximately half of research expenditures in the Public Health Service, including research grants, are devoted to basic research. Some fundamental research is also supported by the Army and Navy, chiefly in contracts with universities.

Philanthropic and industrial foundations spend an estimated total of $15 million annually for research in medical and allied sciences.

Industrial foundations spend about $5 million annually.

National voluntary health associations spend an estimated $10 million annually on medical research and development.

Industry is the largest single investor in medical research in the country. Its estimated annual expenditures of at least $50 million is nearly twice that of the Federal Government, and three to four times that of the foundations.

Universities and medical schools spend considerable sums for medical research, but they are not in themselves important sources of funds for this purpose. Only insofar as the schools siphon funds from the general budgets and endowments into research may they be considered as investors in medical and allied sciences.

Analyzing the shortage of trained personnel, the report states:

The discovery of one first-class investigator in every medical school each year would more than repay any expenditure necessary to provide opportunities and support for medical students who show aptitude for research.

Discussing the financial crisis in schools, the report states:

The high cost of medical education explains in part the shortage of such facilities in the United States. In 1946 there were only 69 approved 4-year medical schools—41 private, 38 public—and 8 approved 2-year schools of basic medical science. All but one of the 2-year schools hope to expand to full 4-year curricula, and 2 new 4-year medical schools are being established by West Coast States.

The cost of research is a large factor in the present high cost of medical education. Not only must there be laboratory space, equipment, and supplies, laboratory aides and animal keepers, but there must be additional teaching staff to allow time for research. These salaries are the largest item in the cost of research. Only a few medical schools can now assume them as regularly recurring expenses.

Mounting Deficit.—If medical schools had to operate on the tuition fees charged to students, there would be no physicians. The minimum cost of medical education is $1,500 per student per year; the average tuition in 1946 was $450. There has been very little increase in the annual production of graduates by approved schools since 1934. The average annual number of medical school graduates at present is between 5,300 and 5,500. On this basis, the medical schools have a net deficit of $1,050 a year for each student—a total of more than $5 million—to be met annually by other sources of income in order to produce about 5,000 graduates. A more realistic estimate probably would be a deficit of some $7.5 million. Yet, nearly half of the medical and basic science schools now charge between $500 and $600 tuition, and the high cost of medical education to the student has been another deterrent to the expansion of training programs and the establishment of new facilities. Current student fees, indeed, have caused protests against the economic barrier between the young men and women who are qualified to enter medical college but cannot afford to do so.

Public Support.—Tax funds are the most likely source of new money for the general support of medical schools. There is a direct public interest in maintaining the standards of medical education, indeed, of raising the standards. A few States, such as Pennsylvania, have recognized this responsibility and are already providing financial assistance to private medical schools, as well as to State institutions. Public assistance in one form or another is being sought in other States.

Public support of medical education generally and of medical research entails recognition of the fact that trained investigators, both those with an established reputation and those who show promise of becoming productive research scientists, should be given opportunities to carry on research in the institutions of higher learning to the limit of their effective capacity.

Future expenditure of public money for the support of medical investigators in scientific investigations depends upon: (a) the general support of graduate education, (b) the sums available for specific investigations from other sources, (c) the rapidity with which fresh practitioners can be interested and trained in medical research as a career, and (d) the rate of scientific progress in specific fields of investigation.

With regard to coordination of Federal Medical Research, the report states:

The current instruments, methods, and machinery for evaluating medical research in the Federal agencies are incomplete, are not utilized by all agencies, or are applicable only to certain types of research. Objective methods of evaluation are needed as a basis for decision on the support of research in all agencies. Since research can best be evaluated by research scientists, the scientific staffs of the several agencies should take the lead in working out methods by which they themselves can objectively evaluate the medical research undertaken in their laboratory and in cooperating institutions.

Discussing Federal research grants, contracts and fellowships, the report states:

Government administrators of research grants and contracts should be able to make careful studies rivaling those of the foundations. Without such preparation, they cannot discriminatingly select and follow up projects and scientists.

Commenting on the time-lag between receipt of an application for a grant or a contract and final decision as to its disposition, the report observes that there should be:

Study of ways to shorten the time between project application and final action is necessary. Careful review of applications is required

and participation by advisory groups desirable. Careful review should not, however, require several months.

Regarding overhead costs to investigators, the report states:

It is recommended that the advisory Committee on Medical Research of the Interdepartmental Committee on Scientific Research and Development formulate a Government-wide policy for the allowance of overhead charges to recipients of Federal research grants and contracts.

Significant excerpts from the conclusions and recommendations expressed in the summary of this volume are:

As quickly as possible, national expenditures for medical research should reach $300 million annually—nearly three times the present rate. Most of this expansion must come from public funds. Industrial research can and probably will expand, but it cannot and should not be counted upon to provide the needed impetus for basic research.

Federal support for research should supplement, not replace, other funds.

The stimulation of fundamental discoveries must be a keystone in the over-all expansion of medical research. The Federal Government must take the lead in this field by increasing promptly its support of basic research.

The Federal Government should continue its sound policy of utilizing outside scientific advisers. It must, however, resist any tendency to create medical research monopolies.

Balancing Research.—Disease investigations of the Federal Government are principally directed toward finding the cause of the disease. One-fourth of all medical research projects in all agencies are in etiology. Chemotherapy, antibiotics, and epidemiologic research with respect to specific diseases follow etiology in that order. The several agencies vary, however, in the relative importance assigned to these approaches to the study of specific diseases.

To the extent permitted by law, the agencies of the Government should move promptly to correct this imbalance. Because the research work of the Public Health Service is not directed to the medical problems of special population groups and because that agency has been charged by the Congress with responsibility for the health of the whole population, it should direct increased research effort to those diseases and impairments which are now receiving insufficient attention but which are major causes of death and disability.

A National Policy.—There is no national policy for medical research. Government agencies do research within their own laboratories and support it in outside institutions. While these activities are coordinated informally to a limited extent, each agency carries out its own program more or less independently along lines suggested by staff scientists and outside advisers. There is no over-all planning authority which has either the responsibility or the resources to insure the effective coordination of the several research programs, the full utilization and exploitation of existing Government resources or which has an opportunity to relate the research work of Government to research supported by private sources.

An advisory committee of Government and non-Government medical scientists should be established at once. This Medical Research Committee, at least at the outset, should function as a subcommittee of the Interdepartmental Committee recommended in volume one of this report. The Medical Research Committee should be wholly advisory and should concern itself with large-scale long-range planning for a national medical research policy. The committee should recognize the respective contributions of public and private agencies, existing Government programs and resources, and the need for periodically adjusting Government programs in accordance with changing needs.

NONPROFIT HOSPITAL PROJECT FIRST TO RECEIVE APPROVAL UNDER HOSPITAL CONSTRUCTION ACT

On November 5, 1947, the Surgeon General of the Public Health Service approved the application of the Chattahoochee Valley Hospital project, a nonprofit institution of Langdale, Alabama, for a hospital construction grant under the Federal Hospital Survey and Construction Act. This was the first application to obtain approval under the Act.

Project applications are processed by the State agency in order of priority insofar as funds are available for construction and operation. In recommending an application to the Surgeon General, the State agency must certify that it conforms to the State plan, that Federal and State requirements have been met, and the project is entitled to priority under the regulations.

The Surgeon General must approve any application recommended by the State agency if he finds that it complies with the approved State plan and with the regulations, and if funds to cover one-third of the construction costs are available from the State's allotment. If, after giving an opportunity for a hearing, the Surgeon General disapproves an application or withholds funds for failure to comply with legal requirements, an appeal may be taken to the U. S. Circuit Court of Appeals by the State agency.

The Federal share of construction costs will be paid in installments, on certification by the State agency. Payments will be made through the State agency unless it lacks legal authority to pay applicant, in which case payment will be made direct to the applicant.

The following questions and answers are excerpts from "Hospital Quiz," Division of Hospital Facilities, U. S. Public Health Service:

Will every community get a share of the federal funds through the state program?

No. Each community will be considered on the basis of its needs and the basis of its ability to meet certain requirements set up by the Hospital Survey and Construction Act. Since the amount of money authorized by the Act is not enough to build all the needed hospitals and health centers, those communities with the most urgent need will come first.

Are there any limits as to the size of the hospital we should consider building?

There is no established size or number of beds which a hospital should contain. It is desirable that general hospitals range in size from 50 to 700 beds. Hospitals of over 700 beds tend to lose personal relations in their services. On the other hand, hospitals of less than 50 beds, generally cannot afford to provide the varied types of service needed.

How much will it cost us to build and equip a new hospital?

The total cost of constructing and equipping a new hospital may be estimated roughly in terms of cost per bed. This cost will vary in different parts of the country and will probably range from $8,000 to $12,000 per bed.

How much will it cost us to operate a hospital?

The annual budget for operation of a hospital may be estimated at one-third of the total cast of constructing and equipping the hospital.

How many people will we need to run the hospital?

In general, it takes 1.5 persons per patient per day to operate a hospital efficiently. This figure includes doctors, nurses, technicians, orderlies, cooks, dietitians and all other personnel needed to care for the patient and maintain the hospital.

HEALTH IN THE UNITED STATES, FIRST HALF OF 1947

Lower incidence than for the same period last year was reported in the first half of 1947 for diphtheria, the dysenteries, malaria, measles, meningococcic meningitis, mumps, poliomyelitis, scarlet fever, smallpox, typhoid fever, and typhus fever. Increases were reported for chickenpox, influenza, septic sore throat, tularemia, undulant fever, and whooping cough.

On the basis of a 10 per cent sample of death certificates, the National Office of Vital Statistics reports lower death rates for tuberculosis, pneumonia and influenza (combined), the common communicable diseases of childhood, and syphilis. Although more cases of influenza were reported in the first 6 months of 1947 than for the same period in 1946, the estimated death rate for influenza and pneumonia (combined) for this period in 1947 was 55.8 per 100,000 population, or 5 per cent below the rate of 58.9 in 1946. The influenza epidemic appeared later than usual in 1947, beginning the latter part of February or early in March.

The more favorable mortality from the "prevalent diseases of childhood" was due largely to lower rates for diphtheria, meningococcic meningitis, and measles during the first half of 1947. Measles was in the epidemic phase during the early part of 1946.

The estimated death rate from nephritis was 60.1 per 100,000 population for the first 6 months of 1947, as compared with 65.0 for the corresponding period of 1946. Except for nephritis, there appears to have been no significant change in the death rate for the diseases of the cardiovascular-renal system. (Deaths from diseases of the heart, the circulatory system and kidneys are included in this group.)

The estimated maternal mortality rate of deaths from puerperal causes was 1.5 per 1,000 live births for the first 6 months of 1947, as compared with 1.7 for the corresponding period in 1946; and the adjusted infant mortality rate was estimated to be 34.6 per 1,000 live births for the first 6 months of 1947, as compared with 38.4 in 1946.

VETERANS TRAINING IN MEDICAL FIELDS

One in every twenty-five disabled veterans in training under the Vocational Rehabilitation Act (Public Law 16) is studying some phase of the medical field, ranging from laboratory technician to physician, Veterans' Administration said.

According to a VA sampling of the records of some 229,000 handicapped ex-servicemen and women in training on May 1, 9,029 veteran-trainees were enrolled in medical, dental, pharmaceutical schools and the like.

Following is a breakdown of the medical trainees:

Physicians	1,529
Dentists	983
Opticians	799
Optometrists	712
Pharmacists	1,354
Chiropractors	427
Laboratory technicians	2,626
Veterinarians	599

Veterans with service-connected disabilities are eligible for education and training under Public Law 16 if they require such training to restore their employability.

The period of education depends upon the time needed to complete the course and become employable, although the maximum is 4 years, except in special cases.

While a veteran is in training, and for 2 months after his employability has been determined, he will receive a subsistence allowance from VA in addition to his disability compensation.

If his disability is rated at 30 per cent or higher, he will receive a minimum allowance (subsistence and compensation) of $115 a month if he has no dependents or $135 if he has one dependent.

If his disability is less than 30 per cent, his minimum allowance will be $105 a month if he is without dependents, or $115 if he has one dependent.

An additional allowance will be paid, in both cases, if he has more than one dependent.

All Public Law 16 training ends 9 years from July 25, 1947.

APPLICATIONS FOR TRAINING BY VETERANS

One out of every two of the 14,500,000 World War II veterans has applied for some form of education or training under laws administered by Veterans' Administration, a 50 per cent increase over a year ago.

VA said the number of applications received does not indicate the number of veterans who have entered training or are now in training. The applications merely denote the veterans' interest in the educational and training advantages of Federal laws.

Applications of 7,149,000 veterans by the end of September 1947 included 6,359,000 who applied for education or training under the GI Bill and 790,000 who sought vocational rehabilitation under Public Law 16 for disabled veterans.

More than 61 per cent of the applicants, or 4,370,000, actually had entered training at some time prior to September 30, 1947.

The majority who entered training registered under the GI Bill with 4,014,000, or 63 per cent, enrolling for study in schools and colleges or for on-the-job training. Of the disabled veterans applying for vocational rehabilitation, 45 per cent, or 355,000, started training.

During September 1947 a total of 447,000 veterans entered or re-entered training, bringing the number of veterans in training to 1,980,000 at the end of the month. There were 1,766,000 veterans training under the provisions of the GI Bill and 214,000 training under Public Law 16.

Most of the veterans in training at the end of September were enrolled in schools and colleges. Of the 1,098,000 taking institutional training, 1,013,000 were studying under the GI Bill and 85,000 under Public Law 16. The 671,000 taking on-the-job training included 564,000 GI Bill trainees and 107,000 Public Law 16 trainees. Institutional on-farm training attracted 211,000 veterans, 189,000 in training under the GI Bill and 22,000 under Public Law 16.

September enrollments in all types of training under both laws represent the first increase in total enrollments during any month since April, 1947, when a peak enrollment of 2,674,000 was reached.

The enrollment drop since April 30, 1947, resulted mainly from veterans leaving institutional training for the summer months. Many of these are expected to resume training this fall. By the time fall registrations have been completed, VA expects total enrollment figures to top last April's peak.

Veterans are eligible for training under the GI Bill if they served in the armed forces for 90 days or more at any time between September 16, 1940, and July 25, 1947, and were discharged under conditions other than dishonorable. The 90-day service minimum is waived if the veterans were discharged for disabilities actually incurred in service in line of duty.

The period of training to which they are entitled depends upon the length of their active service. Eligibility is generally for 1 year, plus a period equal to the time spent in the armed forces. The maximum training is 4 years.

Training must be started within 4 years of July 25, 1947, or date of discharge, whichever is later. The program ends July 25, 1956, except for enlistees under the Armed Forces Voluntary Recruitment Act of 1945 who have until 9 years from the date of termination of enlistment to complete their training programs.

NEW MEMBER OF VA NATIONAL ADVISORY BOARD

Dr. William A. Hunt, professor of clinical psychology at Northwestern University, Chicago, has accepted appointment to Veterans' Administration national advisory board on medical problems, VA announced November 5.

Miss Cathryn R. VerMurlen, well-known dietitian from Grand Haven, Mich., has resigned from the advisory board to accept a full-time position with VA as assistant chief of the dietetic service in the Atlanta, Ga., branch office. No successor has been named.

The board, appointed in compliance with Public Law 293, 79th Congress, acts in an advisory capacity to General Omar N. Bradley, Administrator of Veterans' Affairs, and Dr. Paul R. Hawley, chief of VA's Department of Medicine and Surgery, on over-all policies concerning medical service to veterans.

Members are: Dr. Charles W. Mayo, Mayo Clinic, Rochester, Minn., chairman; Dr. Charles F. McCuskey, Glendale, Calif.; Dr. John S. Voyles, St. Louis; Dr. Paul Titus, Pittsburgh; Dr. Guy W. Brugler, Cleveland; Dr. W. S. Middleton, Madison, Wis.; Dr. Francis J. Braceland, Rochester. Minn.; Dr. Claude O. Coleman, Richmond, Va.; Dr. Francis M. McKeever, Los Angeles; Miss Katherine J. Densford, Minneapolis; Dr. Derrick T. Vail, Chicago; Dr. A. R. Shands, Jr., Wilmington, Del.; Dr. Dean M. Lierle, Iowa City; Dr. Roy Kracke, Birmingham, Ala.; Dr. A. C. Christie, Washington, D. C.; Miss Eleanor Cockerill, Pittsburgh; Dr. J. Stewart Rodman, Philadelphia; Dr. George F. Cahill, New York City, and Dr. William A. Hunt, Chicago.

NEW HEAD OF VA PHYSICAL MEDICINE REHABILITATION SERVICE

Dr. Donald A. Covalt, chief of Veterans' Administration physical medicine rehabilitation service, has resigned, effective November 15, to become associate professor of physical medicine and rehabilitation in the New York University School of Medicine and also head of NYU's new Rehabilitation Institute, Dr. Paul R. Hawley, VA medical director announced November 4.

Dr. A. Ray Dawson, for the past year and a half head of the physical medicine rehabilitation service in the Richmond, Va., Branch Office of VA, has been named to succeed Dr. Covalt.

Dr. Dawson is a native of Reedville, Va. He attended VPI and William and Mary College in Virginia and obtained his M.D. degree from the Medical College of Virginia at Richmond.

He took residency training in psychiatry at St. Elizabeth's Hospital in Washington, D. C., and for 6 years was with the U. S. Civil Service Commission. He practiced internal medicine at Walter Reed Hospital in Washington and for a short

time was assistant to the secretary on the Council of Industrial Medicine in charge of rehabilitation for the American Medical Association in Chicago.

During the war, he was assigned to duty in the office of the Surgeon General, the Office of the Air Surgeon, was a flight surgeon and helped open one of the Air Forces' first rehabilitation centers, at Maxwell Field, Ala.

Dr. Covalt is a native of Muncie, Ind., and a graduate of Indiana University Medical School. He practiced in Muncie for about 9 years.

Dr. Covalt joined VA in 1945 after serving as chief of rehabilitation for the Air Corps.

He is a recognized leader in the field of physical medicine and rehabilitation and was in charge of establishing medical rehabilitation units in VA's 126 hospitals.

As head of NYU's Rehabilitation Institute, one of the first of its kind in the country, Dr. Covalt will have an opportunity to extend his wide experience in the rehabilitation field to the civilian population.

NEW VA DEPUTY MEDICAL DIRECTOR

Appointment of Dr. Arden Freer of Washington, D. C. as deputy medical director of Veterans' Administration, was announced October 30 by Dr. Paul R. Hawley, VA's chief medical director.

Dr. Freer succeeds Dr. Robert C. Cook, who requested transfer to Colorado, where he will be manager of the VA hospital at Fort Logan.

Dr. Freer is a native of Neversink, N. Y. He obtained his education at New York University and Bellevue Hospital Medical College, graduating in 1913. He interned at Bellevue Hospital from 1913 to 1915.

Dr. Freer was commissioned a first lieutenant in the Army Medical Corps April 16, 1915, and retired with the rank of colonel on May 31, 1947, completing 32 years of active duty. He joined VA on January 1, 1947, as executive officer to the chief of professional services.

During World War II, Dr. Freer was awarded the Legion of Merit for service as chief of medical service and later executive officer at Walter Reed General hospital; the Distinguished Service Medal, for his work as chief of professional administrative service, Surgeon General's Office, and the Army Commendation ribbon in recognition of his work as director of the medical consultants division, Surgeon General's Office, where he served from October, 1942 to December, 1946.

Dr. Freer is a fellow of the American College of Physicians; fellow and governor for the Army, American College of Chest Physicians; and fellow and former member of the House of Delegates (Army), American Medical Association. He also is a member of the Association of Military Surgeons and a diplomate of the American Board of Internal Medicine.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE TO MEET IN CHICAGO, DECEMBER 26-31

Fifty societies will meet with fifteen sections of the A.A.A.S. at its one hundred fourteenth meeting, to be held in Chicago, December 26-31, 1947. Many osteopathic physicians who are members of the A.A.A.S. are planning to attend.

In a recent survey of osteopathic colleges, it was learned that nearly fifty members of the faculties belong to this large organization of scientists, now numbering 33,000. The society has some representation from nearly every scientific activity in the nation.

In 1948 the A.A.A.S. will celebrate the hundredth anniversary of the founding of the society. At the present time a drive for memberships is in progress, with 50,000 as the goal. Members of the A.A.A.S. are requested to send in nominees to the headquarters office, 1515 Massachusetts Ave., N.W., Washington 5, D. C.

Faculty members of osteopathic colleges are particularly urged to become affiliated with the A.A.A.S. Those who already are members should nominate their colleagues. The Washington office will eliminate the names of those who are members or are nominated by others.

Central office would like to have the name of every osteopathic physician who is a member of A.A.A.S. Address Miss Josephine Seyl, Department of Statistics and Information, American Osteopathic Association, 139 N. Clark Street, Chicago 2, Ill.

COMMITTEE ON SPECIAL MEMBERSHIP EFFORT

STEPHEN B. GIBBS, D.O.
Chairman
Coral Gables, Florida

OPEN LETTER TO EVERY A.O.A. MEMBER

Dear Doctor:

As of the present writing (just past the middle of November) about 800 members or 10 per cent of our total membership have not as yet paid their current 1947-48 dues. Some of this group will send in their dues before the final deadline January 1. Many others will fail to observe the deadline and will be dropped from membership. Then there are some who will send in their dues sometime before June 1, 1948, thereby being reinstated but will not be listed in the Directory. We do not like to make pessimistic predictions, but we are certain that an alarming number of careless members will disregard the payment of dues entirely and be lost to our membership list. This delay in payment of dues entails a tremendous amount of correspondence which causes a lot of unnecessary work and expense in the Central office. Who pays the expenses? You do.

Who pays your expenses, doctor? Your patients do. Just suppose that a large group of your patients, after receiving 6 months' professional service, decided to leave you and refused to pay your professional fee. We dare say that you would be depending upon those fees to take care of your office expense and your family. Well, the American Osteopathic Association has been depending upon payment of your dues to help defray expenses. It is only fair to expect members, who have received service for the past 6 months to pay for it.

Just suppose that everyone of the 800 who are behind in dues refuses to pay them. The American Osteopathic Association income would be reduced $24,000. Your Association cannot afford to lose the smallest portion of its members.

The Membership Committee and the Central office work very hard every year to obtain new members. We are proud to say that the results are most satisfactory. However, the end result of all of this fine work is regrettably minimized by the losses every year through nonpayment of dues. What a pity! Investigation has proved that more than 90 per cent of the reason for nonpayment is just pure carelessness.

There are still over 3,000 nonmembers or "hitchhikers" in our profession. The ratio of members to nonmembers is 8 to 3. That means that every 8 members are carrying the burden of 3 more who ride free. Shame on those "hitchhikers."

Between now and January 1 let us all try hard to make the "free riders" realize their responsibility and pay their way by joining the Association.

S. B. G.

MEMBERSHIP REPORT AS OF NOVEMBER 1, 1947

Membership count, October 1, 1947		8,068
Applications received in October, 1947	24	
Graduates licensed in October, 1947	25	
	49	
Deaths and Resignations in October, 1947	15	
Gain in October, 1947		34
Membership Count, November 1, 1947		8,102

HONOR ROLL

Dr. Hazel G. Axtell	Dr. Raymond P. Perdue
Dr. Roy L. Brown	Dr. C. A. Povlovich
Dr. Robert D. McCullough	Dr. Walter H. Siehl
Dr. C. W. Millard	Dr. John P. Wood

GRADUATE COURSES OFFERED

College of Osteopathic Physicians and Surgeons (Los Angeles).—Four courses offered: Eye, Ear, Nose and Throat, January 5-16, 1948; Laboratory Surgery, January 19-February 13, 1948; General Medicine, February 23-March 19, 1948; and Cardiology, March 29-April 9. Write to Edward T. Abbott, D.O., Dean of the Graduate School, 1721 Griffin Ave., Los Angeles 31, Calif.

Kirksville College of Osteopathy and Surgery.—Osteopathic Therapeutics, January 26-31, 1948, H. V. Hoover, D.O., Tacoma, Washington, Robert B. Thomas, D.O., Huntington, W. Virginia, and members of the faculty; The Herniated Disc, February 5, 1948; Endocrinology, March 4, 1948; Eye, Ear, Nose and Throat Problems, April 1, 1948.